Telephony

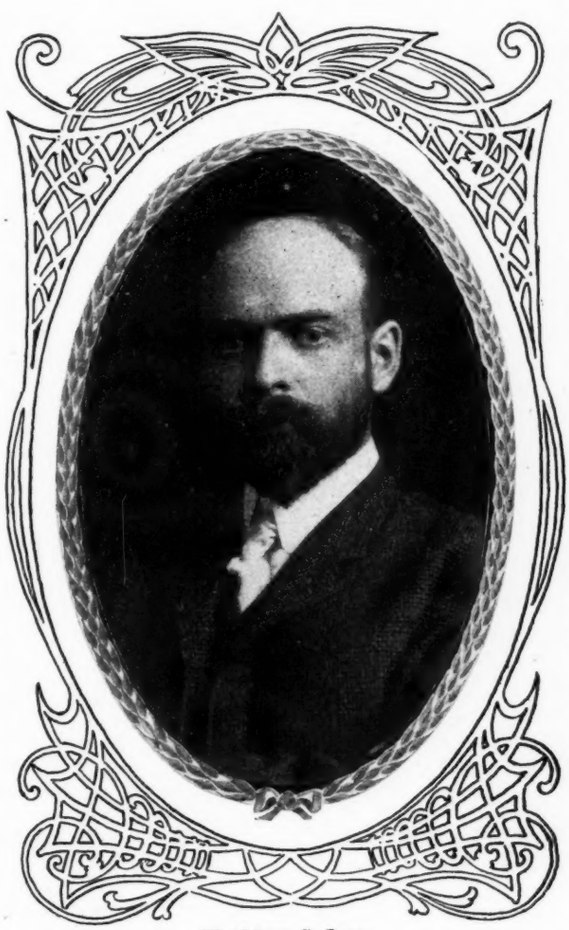
VOL. XIV. DECEMBER, 1907. No 6.

INDEPENDENT TELEPHONE MEN

A Biographical Sketch of Thaddeus S. Lane, of Butte, Montana

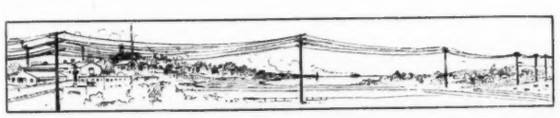
By R. G. Shelden

BUTTE, Montana, is in Silver Bow county, and heretofore has been noted for its copper and silver mines. Added to these, it now has the distinction of having one of the finest Independent telephone systems in the country. This system, which gives service to the citizens of Butte, and will eventually cover the state of Montana as well as the adjoining states, owes its existence to the subject of this sketch, Thaddeus S. Lane, and his associates. When Mr. Lane selected Butte as the basis of his operations, he surrounded himself with some of the leading men of the state, who have formed a strong company which will give the people of Montana first-class telephone service. Mr. Lane, who was born at Gustavus, Ohio, in 1872, is one of the well known Independent telephone men of the United States. While a comparatively young man, he has taken an active part in the development of Independent telephony in different parts of the country. He embarked in the telephone business in 1901; but prior to that date was sales manager of the Warren Electric Specialty Company, located at Warren, Ohio. In 1901 he secured a telephone franchise at Jamestown, New York, and organized the Home Telephone Company of Jamestown. He supervised the building and development of the entire system, and when the exchange started, it had about 3,000 subscribers in service. During the years of 1902-03, he built numerous small exchanges in Chautauqua county, New York. In 1903 he became associated with the Consolidated Telephone Company of Buffalo, and was later made general manager of the Interocean Telephone and Telegraph Company. In that position he had charge of the development of forty-two exchanges in western New York. These exchanges were located in such towns as Salamanca, Corning, Penn Yan, Waverly, LeRoy, Sayre, N. Y., and Athens, Pa. This development also included some 1,500 miles of toll line. Mr. Lane still retains a considerable interest in the Home Telephone Company of Jamestown and numerous other Independent companies in western New York. He went to Montana in April, 1906, and organized the Montana Independent Telephone Company, with a capitalization of $1,500,000, which company's plant is illustrated and described on the pages immediately following this biographical sketch. During the years of 1904 and 1905 Mr. Lane was secretary of the New York Independent Telephone Association, and a delegate to the International Independent Telephone Association. He is a thorough business man, unassuming and popular among telephonists, and takes a great deal of interest in national and state association work. He has succeeded in giving Butte, Montana, a modern Independent telephone system, and unquestionably will be heard from in connection with the telephonic development of the far West.



Thaddeus S. Lane.

Not the least important reason for Mr. Lane's notable success is his ability to inspire confidence in the business men associated with him in telephone enterprises. Needless to say he deserves that confidence by his intelligent and efficient policy and management.



Trade Mark (TELEPHONY) *Registered in United States Patent Office. Copyrighted, 1907, by the Telephony Publishing Company, Chicago, Illinois.* ***All rights reserved.***

BUTTE'S NEW TELEPHONE EXCHANGE

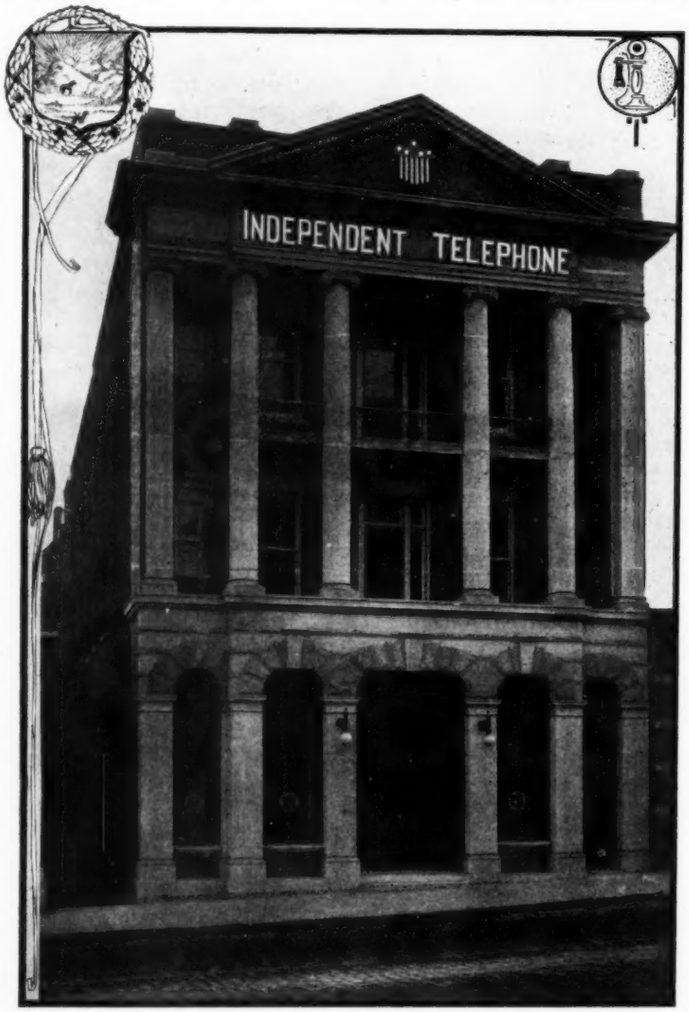
The Montana Independent Telephone Company Shows Laudable Enterprise and is Rewarded by Reaping Substantial Success

By R. D. Foster

SEPTEMBER 16, 1907, when the Montana Independent Telephone Company opened its new exchange at Butte for service, it came into possession and use of one of the most modern and complete exchanges in the western country. To Thaddeus S. Lane, the managing director, and his aids and assistants and to the Montana men who have invested their money in the enterprise vast credit is due for their zeal in furnishing the city of Butte a telephone system which is up-to-date in every particular.

The Montana Independent Telephone Company was organized in June, 1906, with an authorized 6 per cent bond issue of $1,500,000, and a stock issue of the same amount. The territory which the company has under immediate development includes the city of Butte, with a population of 86,000; Anaconda, 15,000; Helena, 20,000; Missoula, 10,000; Great Falls, 18,000; together with connecting toll lines. The company has been granted liberal franchises in all the cities of importance included in this territory, and enjoys the confidence of the people of that region generally.

At Butte the company has already booked orders for 3,000 telephones, 2,000 of which are now in operation. In addition to a fine, fireproof office building erected in Butte, to be used as a general office for the state, the company will erect its own buildings at Great Falls and Helena. The company has been financed on a conservative basis, and its securities have been taken up readily by Montana investors, all of the money invested in the enterprise being Montana capital. The securities of the company are considered by investors throughout the state as being exceptionally good, and with great possibilities in the future. More than 400 Montana investors, representing nearly every large interest in the state, as well as every trade and profession, have become financially interested in the enterprise.



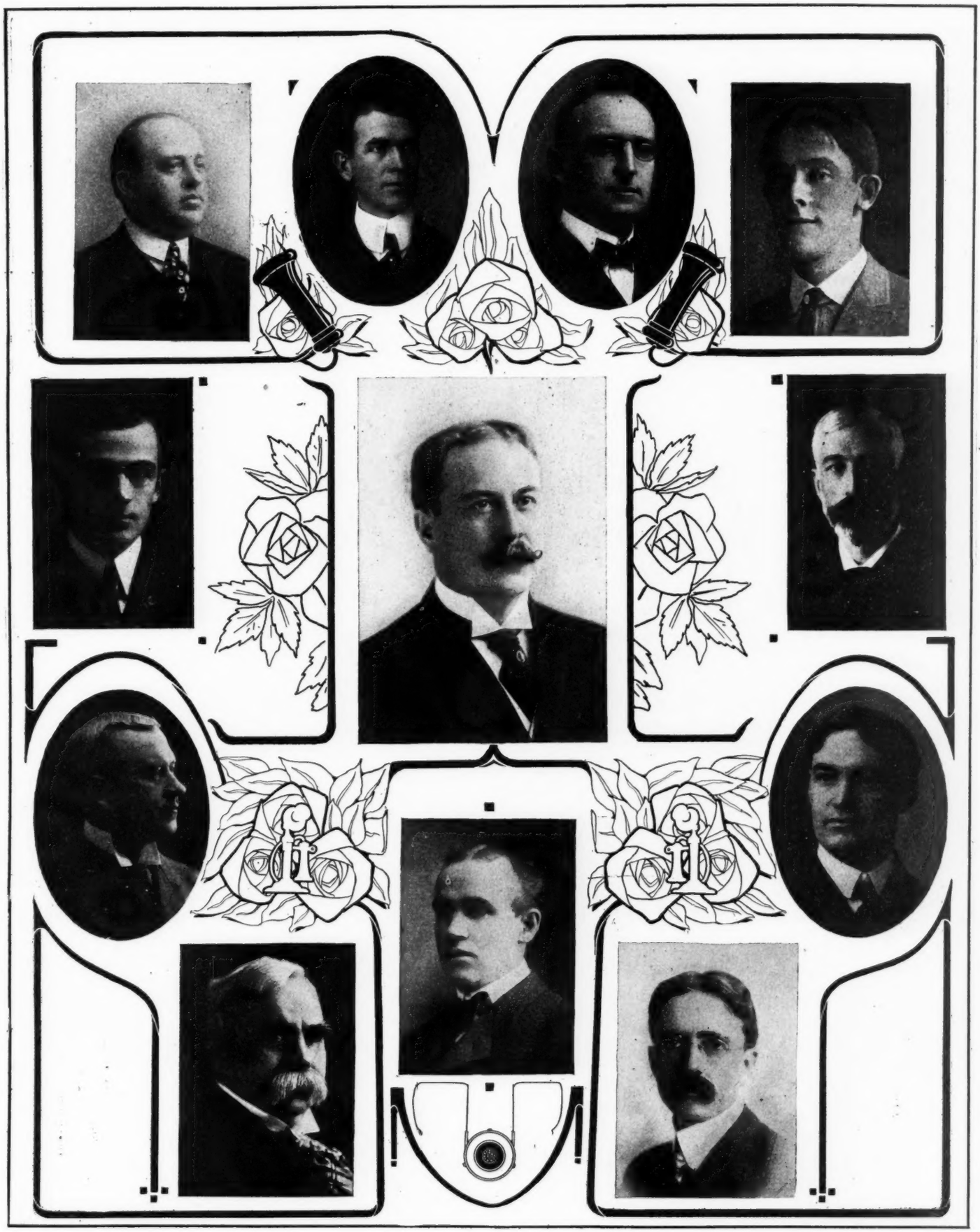
Building of the Montana Independent Telephone Company at Butte.

The officers of the company are: H. A. Gallwey, president; Thaddeus S. Lane, managing director; P. B. Moss, vice-president; C. J. Kelly, secretary and treasurer. The board of directors are as follows: A. J. Davis, president of the First National Bank, Butte, Mont.; W. G. Conrad, president of the Conrad Banking Co., Great Falls, Mont.; P. B. Moss, president of the First National Bank, Billings, Mont.; C. J. Kelly, manager of the Hennessy Mercantile Company, Butte, Mont.; Elmer B. Jones, Salt Lake City, Utah; Thomas Couch, Jr., Great Falls, Mont.; Thaddeus S. Lane, managing director, Butte, Mont.; C. F. Kelley, secretary of the Anaconda Copper Mining Company, Butte, Mont.; J. T. O'Brien, of Fariss, O'Brien & Rowe, Butte, Mont.; H. B. Brown, manager of the securities department, Butte, Mont.; F. H. Clinton, superintendent of the Electric Light & Street Railway Company, Anaconda, Mont.; L. O. Evans, attorney, Butte, Mont.; H. A. Gallwey, manager of the Parrot Mining Company, Butte, Mont.

The equipment and telephones throughout the entire system are being furnished by the Automatic Electric Company of Chicago. The central office equipment occupies the entire third floor of the central office building. Some idea of the size of the switchboard room can be gained from the fact that it embraces a main distributing rack and switchboard with an installed capacity of 3,500 lines, and an ultimate capacity for 10,000 telephones, and the power plant, with the exception of the storage battery, which is located in the rear of the second floor.

The main distributing frame is of the F. B. Cook manufacture, type No. 10, mounted 100 pairs to the upright on the switchboard side, and 125 pairs on the line terminal side. The rack is so installed as to permit of additions to rack at each end as the exchange increases, the party line uprights increasing to the left, and the straight lines at the right of rack. The switchboard proper comprises both the straight line and party line equipment, as a preliminary canvass of the business developed a strong demand for party line service.

The straight line equipment is the latest type line switch, automatic, which has been installed and operated with so much success in various exchanges by the Automatic Electric Company, of Chicago, for the past year and a half. Each board or section is made up of 100 line switches, for which are provided ten outgoing trunks, from which all calls outgoing are made. For incoming calls to each board, ten connecting switches, having control over the entire 100



H. B. Brown. F. H. Clinton. J. T. O'Brien. A. F. Bennett.
L. O. Evans. H. A. Gallwey, president. F. B. Moss.
C. J. Kelley. C. F. Kelley. Thomas Couch, Jr.
W. G. Conrad. E. B. Jones.

Officers and Directors of the Montana Independent Telephone Company, Butte, Montana.

lines, are provided. Between the line switch and the connecting switch is located the trunking section, where the selection of numbers is made in the manner common to all exchanges installed by the Automatic Electric Company.

The party line equipment, which allows two, three or four parties to be operated on one line, makes use of the harmonic ringing principle, and, while ringing on party lines is non-interfering and selective, it does not necessitate the use of a lock-out device. Trunks between the party and straight line switches with an increase over the standard 10 per cent equipment in four of the party line boards takes care of all calls between party line and straight line switches.

The harmonic convertor, or ringing machine, which provides ringing current for the entire exchange, and which is installed in duplicate, furnishes current of four cycles, namely, 16, 33, 50 and 66, of which the 33-cycle current is used for the straight line telephones, and the 16-cycle for long distance lines. The harmonic ringing device is also equipped with a busy signal, for notifying calling subscriber when line called is busy. This portion of the equipment is also furnished by the Automatic Electric Company of Chicago.

The power plant proper consists of a two-panel, pink Tennessee marble power board, fitted with Crouse-Hinds switches and Weston instruments, duplicate sets of Gould storage battery 320 ampere hour cells, 25 cells to each set, with room in tank for an addition of 640 ampere hours capacity and two charging sets, each consisting of a ten horsepower Allis-Chalmers three-phase induction motor, connected direct to a Holtzer-Cabot 75-volt, 80-ampere generator. The power plant throughout is in duplicate, and of sufficient capacity to operate in connection with an exchange of 10,000 lines, or may be added to from time to time in accordance with the growth of the exchange.

Construction Crew Montana Independent Telephone Company.

The telephones—that is, in addition to the standard nickel automatic desk sets—vary but slightly in appearance and finish, all instruments being of the common battery type, and finished in both ebony and antique oak to suit the taste of the subscriber.

The toll board, information desk, and wire chief's desk are finished in mahogany. The toll board and information desk are installed on the first floor, in the rear of the general office. The signals are of the visual lamp type, with double supervision for cord circuits. The toll board is also provided with ten circuits for pay stations, which are operated as manual telephones under direct supervision of the operator. The wire chief's desk, which is located in the switchboard room, is of the two position type, one position being used for trouble clerk. This position is in multiple with the information desk, on the first floor, so that both desks can be taken care of by one clerk at night. The wire chief's desk is provided with the standard volt meter and testing circuits, such as are commonly used in both automatic and manual exchanges.

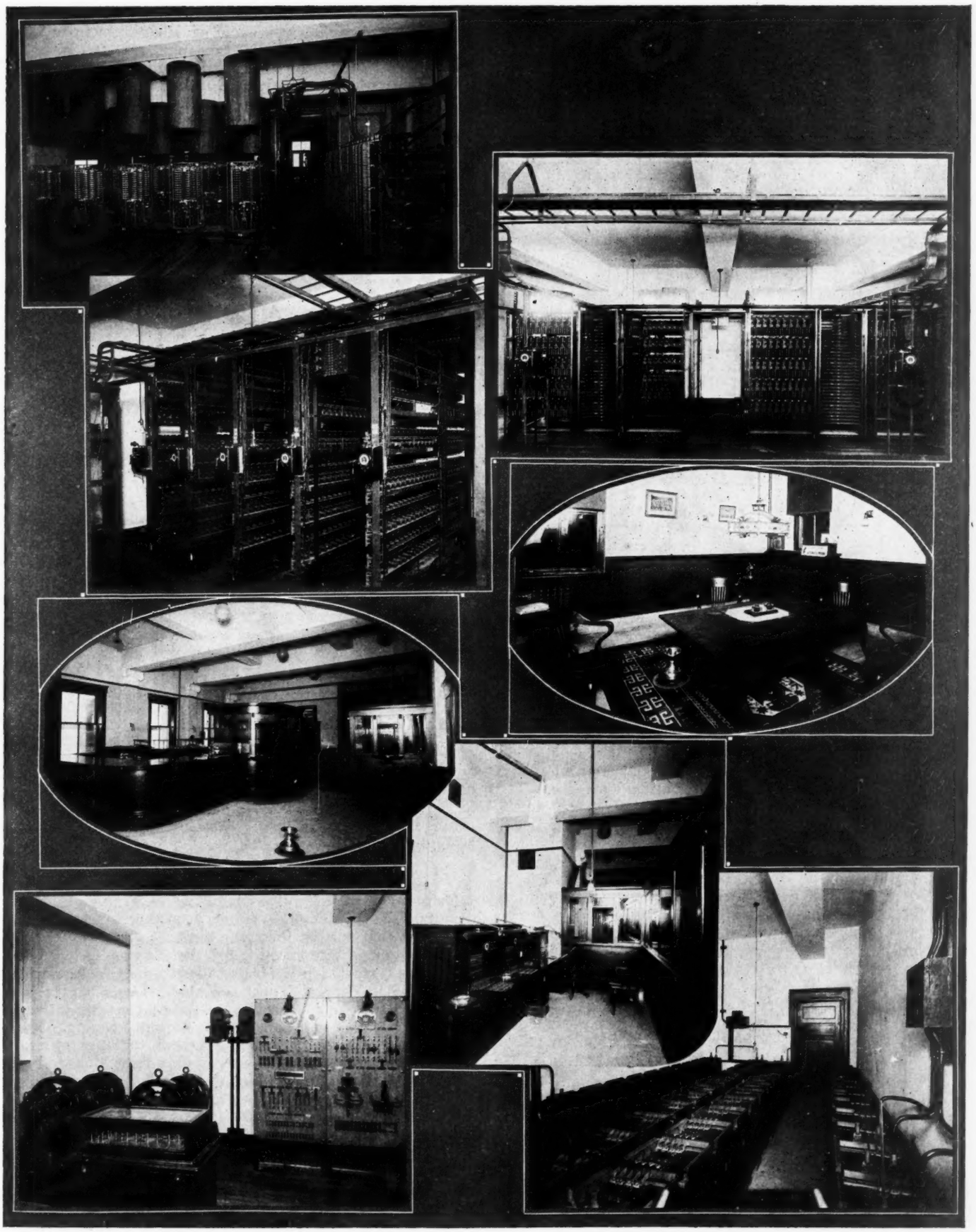
One of the most interesting features in the Butte Exchange is the "tell tale" circuit. Not only are all fuses and heat coils throughout the exchange provided with alarms, but also the driving mechanism of the line switches is furnished with a visual and audible signaling device, which calls the attention of the attendant at once when anything goes wrong. The party line switches are provided with small semaphores, so that switches in operation can be detected and singled out at a glance.

In the residential and outlying district, cable boxes equipped with Sterling protectors have been installed. In some instances, where distribution is not heavy, 10-pair cable has been used.

From the construction man's point of view, Butte is an ideal field, being compact and practically devoid of trees. In the entire construction of the Butte exchange, there is not a single instance where a tree can cause line trouble, and in the maintenance and operation of the plant there will be no surreptitious tree trimming expeditions. Throughout the city the pole lines are all of good height, the policy being to carry all conductors well above the pole lines of other companies.

An extensive campaign of work in territory outside of Butte has been planned. Toll line between Butte and Anaconda has been surveyed, and poles are now being delivered on the ground. Poles are also being delivered for toll line east of Butte to Bozeman. The territory east of Bozeman has been developed, and is now in successful operation with more than 2,000 telephones connected. This is owned by another Independent company.

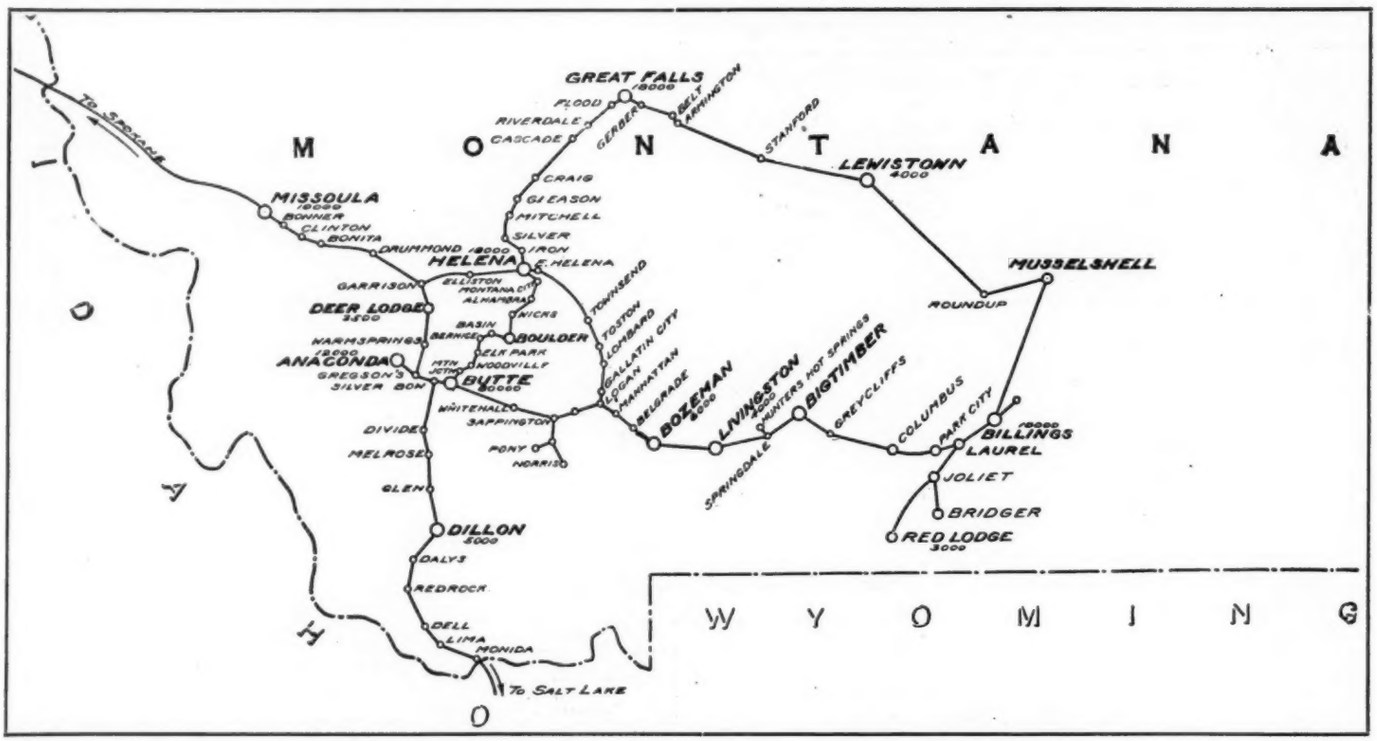
The Montana Independent Telephone Company has installed large private branch exchanges for the Anaconda Copper Mining Company, the Hennessy Mercantile Company, and has orders from a number of other companies using its service extensively.



Straight line switchboard and distributing rack.
Party line switchboard.
General office.
Power plant.
Trunking section for line switches.
Office of managing director.
Toll board and information desk.
Battery room.

Interior views and equipment Montana Independent Telephone Company, Butte, Montana.

The outside construction of the Butte exchange was begun in September, 1906. In spite of the excessive cost of labor of excavation, due to the rocky formation of the sub-soil, the city of Butte being built on a mountain side, a comprehensive system of underground conduits was installed, consisting of nearly 100,000 duct feet of fiber conduit. Manhole number one, which can be reached from the basement of the building from a tunnel six by seven feet, provides twenty-eight ducts out from the exchange; as 400-pair cable is used in most instances for ground cable leads leading from the central office building, the conduit



Map of long distance lines under construction, Montana Independent Telephone Company, Butte, Montana.

installed will provide duct space for an exchange of 10,000 lines, should the Butte exchange ever attain such size.

Throughout the entire plant, a comparatively small amount of open wire is used. In the business district, laterals run direct to the distributing poles, which are equipped with Sterling protecting apparatus, and iron circle tops for distribution. Instead of depending upon local grounds to gas, water or steam pipes, a common return to ground is used throughout the entire system. This is made necessary on account of the rock formation of the soil, and the usual method of making grounds is not practicable. The common return is carried along all leads on a bracket located at the top of poles. In entering buildings, a triple drop wire is used, which terminates at the station protector. Aside from the advantages of a positive ground and return is the saving of inside wire, and the time required for installation. This also avoids unnecessary mutilation of buildings.

NEW YORK STATE ORGANIZING BY DISTRICTS.

In pursuance of the plan determined upon at the recent meeting of the New York State Independent Association, R. Max Eaton, of Niagara Falls, secretary of the association, has sent blanks to one active and well-informed manager in each county in the state, calling for complete information regarding all Independent companies within that county.

This blank sent is most comprehensive in its scope and the data so gathered will be invaluable both the state organization and the International. The headings of the various columns are as follows: Name of village, town, or city; name of operating company; exchange, toll station, or no connections; number of subscribers; name of company controlling operating company; president's name and address; manager's name and address. Bell data desired is: Exchange, toll station, or no connection; and estimated number of subscribers.

Data of this nature have been successfully compiled by several state associations, notably in Ohio and Indiana, and have been found exceedingly valuable. By such aid the Independents have frequently been enabled to disprove the broad claims of the Bell companies, particularly with regard to the comparative number of stations, and the moral encouragement afforded by such absolutely reliable figures is beyond computation.

KANSAS CONVENTION.

By order of the executive committee W. H. Nelson, president, and W. P. Hemphill, secretary of the Kansas association, have sent out the following notice:

"The annual state meeting of the Kansas Independent Telephone Association has been called to meet in the parlors of the Hotel Throop, Topeka, Kansas, December 11 and 12 (Wednesday and Thursday). A fine program is being arranged and this will be a very important meeting. Kansas Independents are urged to be present, together with any of their friends who may be interested in the telephone business. Remember the date, December 11 and 12."

This meeting promises to be an important one, and a large attendance is expected.

TELEPHONE SERVICE IN APIA.

Consul George Heimrod reports that Apia and adjacent plantations in Samoa are now provided by the postal authorities with telephone communication. Within a radius of five kilometers (kilometer equals 0.62 of a mile) the fixed rate for this service is 200 marks, or $47.60 per year, and for every 100 meters (328) service beyond said line an additional charge of four marks, or ninety-five cents, is exacted.

TELEPHONE POWER SYSTEMS

A Paper Read before the Electrical Section of the Western Society of Engineers

By Thomas Lambert

THERE is a trait of character present in most of us which may be called a combined virtue and fault, and it is made manifest in the enthusiasm in which we view our own particular occupation. Nor would I give much thought to a man without the poesy of enthusiasm, nor pay much attention to the claims of him who did not think that his own particular business was the most important in the world. It takes them all to make the world, and right in the face of this I would tell you that no other business in the world has ever had such a phenomenal growth as the telephone business: no other business gives such promise of future growth.

All this I say in defense of my presumption in asking you to give a few moments of your time to the subject of power as applied to telephone work. I would not care to be considered as addicted to the quotation habit; but the old adage that "One half of the world does not know how the other half lives," certainly applies to the telephone business.

If you will but step outside of your own specialty and inquire into the statistics of another's business, you are sure of being astonished at its magnitude. As a long time ago, some one asked what became of all the pins, so we can now ask, who does all the telephoning?

It is but a few years since all the telephones were operated under the local battery system and for many reasons this system is still advantageous in the smaller plants. The local battery telephone system did not rise to the dignity of having a power plant, though often having a ringing generator which was kept running continuously by means of a water or electric motor, and which constituted the power plant. The greatest portion of the power for these local battery systems is furnished by means of the primary batteries located at the several subscribers' instruments, the ringing power being furnished manually by the subscriber.

You understand that the installation of a central energy system, in place of a local battery system, is simply a financial question of engineering and maintenance. A telephone power plant, consisting of a motor generator set and a storage battery with the incidental apparatus necessary for the successful operation of the same, however small the plant, requires considerable attention of an experienced man, and this cannot be consistently added to the expense of maintenance of a small system. But as soon as the system is changed to the common battery or central energy plan, a real power plant becomes necessary, a plant representing considerable investment and requiring careful and economical operation.

In Chicago alone the Chicago Telephone Company has twenty-one exchanges, not to mention almost as many exchanges in the suburban towns of greater or less importance. And by way of illustration, in one single exchange on the day before Christmas last year, on which day, the telephone traffic is generally the heaviest, there was a consumption of electrical energy somewhat in excess of twenty kilowatts for a period of one or two hours, not for illumination nor anything else but talking purposes. In the central office alone over twenty-seven horsepower was used to energize the lines and instruments for talking purposes, and this continued on the occasion mentioned for a period from two to three hours.

Viewing this statement from another light, it means that no less than 10,000 people were simultaneously using telephones in a district having an area of less than one-half a square mile; 5,000 pairs of people were talking over telephones in this district, and it required twenty-seven horsepower to furnish the energy for the service. This was the peak load, to be sure, but it illustrates the demand likely to be made upon a telephone plant at any time and for which demand or even a greater one we must be prepared at all times.

On the occasion of any great calamity, as for instance in the case of the Iroquois disaster, almost every telephone in the city was called into use, making an extraordinary demand on our sources of power. The same is true, though to a less extent, on the occasion of political elections which may have special interest attached thereto. During the evening of the recent mayoralty election, we were compelled to run our apparatus and charge our storage batteries for several hours longer than usual, to care for the increased business occasioned thereby.

The variation of the peak loads for the several exchanges in a city like Chicago is rather interesting. The business districts showing the heaviest loads at 10 to 11:30 a. m. and at 3 to 4:30 p. m.; the all-night load usually falling to a small fraction of the maximum. While in the residence districts the load is indicative of the fact that the people leave home for business about 7:30 a. m. and return at about 5 p. m., retiring at about 10 p. m. The residence district often causes a peak load to occur in the early evening.

It may not be out of place here to describe briefly the simple power circuit of a central energy telephone system. We are operating our systems at a pressure of about twenty-four volts, kept nearly constant by means of a storage battery of eleven cells, the ampere hour capacity of which is adapted to the actual and possible demands likely to be made upon it in service. The battery is arranged in circuit so that it can be charged while at the same time being discharged to give service to the lines running out of the exchange.

The charging is effected by a suitable thirty-volt shunt wound generator which is operated by either an electric motor receiving its current supply from commercial mains, or by means of a gas engine. Generally, the electric motor is directly connected with the thirty-volt generator and in most of the city exchanges we have duplicate generators arranged in such a manner that the system is most flexible, either generator being capable of operation from either motor, cross connecting them by means of belts and detachable pulleys; this plan is adopted for the insurance of operation. Though as a matter of fact, it has seldom been found actually necessary to cross connect the different units.

In the Chicago Telephone Company's system one side of the battery is grounded, and to prevent the current fluctuation due to the commutation in the charging circuit from reaching the battery and consequently appearing on the telephone lines and thereby interfering with service, there is interposed a choke coil or retardation coil adapted to the capacity of the machine and its frequency of commutation. This coil acts to smooth out the current curve enabling us to charge the battery while it is being used without interfering with the traffic.

In our larger offices, the capacity of the storage battery

is such that it will deliver nearly 2,000 amperes of current at twenty-four volts for a period of one hour, or 420 amperes for a period of eight hours after having been fully charged. In our past experience, the highest duty imposed on any of our exchange batteries was about 750 amperes for a period of two to three hours when it fell to between 400 and 500 amperes, or nearly to the eight-hour discharge rate of the battery.

Just for a moment consider what it means to have our source of power absolutely fail during such a period as that mentioned, which is a possibility that must be taken into account. In our central office, for instance, we have two separate charging units with four sources of power, and each unit is capable of generating 650 amperes at thirty volts. Naturally we feel very secure, but suppose that all sources of power should fail at 9:00 a. m. on the day before Christmas, the batteries being fully charged at the time. In this event, the exchange would be hopelessly out of service if the power were not restored before noon.

This brings to mind the fact that it is with the telephone business, based on the nickel per call, or on the measured service basis, the same as it is with the street railway system, or an electric lighting plant, viz: a break in the service means a loss of money that can never again be regained. If the street car service is interrupted and the passengers have to walk home, the nickels for those rides can never reach the coffers of the company, and every electric lighting company is painfully aware of the fact that a stoppage of their meters is a stoppage of their revenue. So with the telephone company; messages will not keep; if the service is interrupted and other means of communication used, it is at a direct loss to the company, and worse than the immediate and pecuniary loss is the damage to reputation, often of great import, especially if franchise favors are sought. It is then a matter of the utmost importance to be as thoroughly insured as it is possible to be, as to the service for power purposes in telephone work. The telephone without the power plant is perfectly helpless and yet that is merely an auxiliary to the system, just as the telephone service itself is auxiliary to a large commercial electric lighting plant.

In addition to the storage batteries and means for charging the same, there are the various ringing generator devices, and all exchanges are in general equipped with small motors of about one horse power capacity, operated from commercial mains to drive one of two ringing generators, either of which can be run as a dynamotor independently of the motor before mentioned, and from the twenty-four-volt battery; the armatures of these machines being doubly wound to generate alternating current at about 110 volts pressure and pulsating current at about sixty volts pressure. These dynamotors, when run from the main storage battery, must be arranged in circuit with a properly designed choke coil to smooth out the effects due to the commutation of the current taken off the battery, so as not to interfere with traffic.

The alternating current is used for ringing single and ten-party lines, and the pulsating current commutated in either a positive or negative direction is used for ringing bells in the semi-selective four-party line service.

The output of these machines is generally from one to two amperes. The above voltage and other specifications for the manufacture of these machines limit the voltage on the secondary side, in connection with the varying loads, to within the amount necessary for the satisfactory operation of the particular equipment used.

By way of explanation we are now adjusting the commutators that pick up the positive and negative pulsating current used on party line ringing, to such a point that in this class of service it is not commutated between the zero points, but between points twenty degrees to thirty degrees ahead of the zero point in the direction of rotation of the armature. This results in a correction of the current effect, otherwise caused by the inductance of the circuit, and eliminates some of the trouble due to interfering rings, by giving a slight touch of positive impulse following a longer negative or a slight touch of negative following a longer positive, in a way to neutralize in part, the lagging effect of the pulsating current.

In connection with ringing generator service, we have also to furnish a number of the smaller private branch exchanges with generator service from the main office of the district in which the branch exchange is located, and as a matter of protection, we fuse this service by means of one-half ampere fuses which we have gone to no little trouble to procure, as the ordinary one-half ampere fuses on the market were often found to carry nearly three amperes before failing.

The accidental grounding of one or two of these generator leads going to the branch exchanges would thus, when fused, result in throwing the ringing generator out of service at the circuit breaker and at the same time throwing the entire office out of ringing generator service, until this or another machine could be started up and the trouble cleared by disconnecting the grounded lines.

Generally, we also run this ringing generator service through a lamp resistance. We have adopted the Tantalum lamp for this purpose, on account of its coefficient of resistance increasing with the heating of the filament, instead of the reverse as is the condition in the carbon filament. This partially protects us from unnatural overloads on our office ringing generator due to a diminution of resistance of the line supplied through the lamp, and fed therefrom.

In connection with the ringing generator equipment, we supply other auxiliary service such as busy-back signaling, tone tests, and howler effects, and also what we denominate as ticker service used on nickel first lines to appraise the subscriber that the line is not being used.

We are now installing in our new offices, and in some of the old ones where changes have become necessary, a type of machine generator to furnish current to the amount of from two to five amperes at a pressure of 110 volts, which is used in either a positive or negative direction as the occasion may require to deposit or return coins in the nickel service. Heretofore the coin boxes have been operated by means of dry batteries located at the same exchange, the maintenance of which, has been exceedingly unsatisfactory and expensive, owing to the fact that on the failure of the voltage of the battery to come up to the proper standard every one of the hundred or more dry cells in service has to be tested, a tedious and expensive process which may occur several times during the week. By the use of these nickel deposit machines, we can keep a more uniform condition and we expect thereby to stop some of the nickel argument with the subscriber, in which doubtless many of you have participated at times.

It may be here worthy of note to say that we have had a great deal of trouble in nickel operation throughout the city, due to varying earth currents apparently dependent upon street car traffic from whose generators the current emanates.

We are gradually overcoming this by working in connection with the street car companies who readily see that this current leakage, while causing the telephone company some trouble, is costing them money; consequently, they have in a number of cases, increased the capacity of their return grounds to mutual advantage.

We are equipped with emergency apparatus and parts necessary for ordinary renewals which can be installed on very short notice. We did have an emergency charging outfit for use in any of our exchanges, so arranged that it could be installed on a few hours' notice and set in operation to supplant the regular apparatus in case of its failure or that of the supply of commercial power; but this ap-

paratus was recently destroyed by fire and we are now considering a more elaborate device, which will be, quite likely a charging plant permanently mounted on an automobile for transportation to any exchange in the city or country on short notice; this to be operated by means of a gasoline engine.

Apart from the power question of the telephone service as applied directly to the lines themselves, there is also the problem of lighting the switchboard, which is very essential to the service, especially at night. We have about half a mile of switchboard in the city alone which must be lighted in order to give satisfactory service on the telephone. This problem of lighting is really quite difficult of accomplishment, as it can come from only one source and that, above and not too far from the face of the board. Furthermore, we have to be careful not to light the key shelf of the switchboard and yet must give sufficient light on its face to enable the operator to read the numbers with a fair degree of accuracy.

Then, too, we must be careful as to the color of the light on account of various traffic schemes in which color is used, as for instance the embracing of certain jacks in one line of a particular color to indicate the fact that all of these lines are of the same number for the use of one firm. We are now lighting these switchboards by means of ordinary carbon filament lamps placed in reflector troughs, designed as nearly as possible for the proper distribution of the light, which we are free to say is far from satisfactory.

For some time we have been trying to get the manufacturers of the Tantalum lamp to make us a light constructed of this filament which shall be in a continuous line, in shape something similar to the Cooper Hewitt light. The difficulty in the production of the Tantalum light was caring for the excessive length of the filament necessary, but in this switchboard lighting the excessive length of filament would be an advantage rather than a disadvantage if the lamp can be constructed in such manner. We have not attempted to suggest a method of manufacture, nor to dictate the units of length in which it would be practical to produce it, though we did point out the commercial advantages for other purposes—like counter and showcase illumination.

The quantity of light we are now using for switchboard lighting amounts to about one candle power per lineal inch of switchboard, which is about the emission rate of the Tantalum filament. We have been assured to ultimate satisfactory results along this line by the manufacturers, but so far have not obtained anything tangible.

Another problem which is part of the power proposition in the telephone business is ventilating the exchanges, which we ordinarily do by means of small individual fan motors. In one building, I believe, without actual count, that we have no less than 200 of these small fan motors in actual operation, or at least equipped for operation and ready for service. The bills for light and power in our city exchange alone are something enormous. I am not at liberty to state the amount, but can say that it covers nearly 200,000 kilowatt hours per month, which certainly forces the telephone business into the power field as a real live customer.

The connection between power work and the telephone field is real, and there is also a parallelism in the problems presented in both telephone and power engineering as it pertains to the transmission of alternating currents; for the telephone engineer who understands the problems presented in his *work must also understand the problems of alternating current transmission.* It is very easy for the man who handles large generators, large engines, immense transformers, and rotary converters to belittle the telephone man because he handles a class of apparatus relatively so small. You know and I know of two classes of men; one can set up and operate a 5,000 horse power Corliss engine and electric generator with ease, but could no more repair a millivoltmeter than he could fly. Then there is the other man who can turn down the balance staff of your watch to a nicety, yet who has no conception of how to begin to carry out the plan of erection of the large type of machinery. Both are good mechanics, but neither is qualified for the work of the other. One is a hairspring mechanic and the other a crowbar mechanic, and the telephone man is of the hairspring variety.

One thing that can be said of the telephone business is that its field has grown so wonderfully that no single individual can possibly hope to master all of its phases. He must specialize, and there is no place left in it for a man to fossilize. If he will stay in it he must keep up with the progress of the art. There is no room in the telephone business for "dead ones." The tendency to specialize is also limited since we must all pull together for a common cause. In closing I want to make a statement that can scarcely be called a prediction, as it is more of the nature of plotting a curve from observed facts. In a very few years the telephone business will be the greatest in the world. Its growth is accelerative, and its value to the subscriber increases in a geometrical ratio with the number of subscribers within reach, and on this basis I think it is fair to presume the statement just made, that nothing can prevent the telephone business from becoming the greatest industry in the world, because it contains within itself the seeds of stability; it meets a need; it meets a want, and its influence on civilization will be most far-reaching. It will bring us together under one language; it will be one of the most potent means in the fraternalization of the world, and may yet be one of the greatest factors in the universal peace plan. I might say something about the distribution of load. Take a battery of a certain capacity. The average case of telephone load starts out about 8 a. m. and gradually goes to the maximum, which is reached at from 10 to 10:30 a. m. As the load reaches the maximum it often excels the output of the generator, consequently we start our generator at a time early enough so that the battery will become fully charged under its influence, whatever the demands made on the battery in the normal work of the exchange shall have exceeded that limit. Otherwise we would never be able to get our battery charged up to its full capacity, and then, in case of a break-down we would have full capacity to carry over a certain period.

We are trying to follow out the requirements asked of us by the suppliers of the storage battery equipment, who ask us to carry them at a certain rate under certain rules, in order to get the best effects, and to do that we have recently designed a controlling device which enables us to automatically charge this battery at a set rate. If the normal charging rate of that battery is, say X amperes per hour, we have an apparatus, in process of construction, that will enable the generator to maintain that charge of X amperes above the discharge. After having reached the full charge, the apparatus is shifted, with the result that the generator operates to carry an actual amount of current to the fuse board exactly equal to the amount of current drawn away from it. So the battery will remain fully charged as long as the generator is running. That will be done automatically. It now depends on the observation of the operator, takes considerable time, and we do not know how well it is being done.

DISCUSSION.

Mr. Davis: I presume that for most small exchanges, and often some of the large exchanges, the practice is to periodically charge the batteries completely, and then let them discharge to the exchange. It occurs to me that, in case of large city exchanges, the same principle might apply as is maintained by the Chicago Edison Company on their general light and power systems, viz: letting the batteries float on the line, fully charged, but with the charging machines operating continuously at such rate as to furnish

the necessary current to supply the varying load, as for example a telephone exchange and thus allowing the battery to serve as a reserve, fully charged at all times, ever on the line and ready to take up sudden fluctuations or to serve as a reserve in case of a breakdown in the charging equipment. I understand that this is the practice of the Chicago Edison Company, and that they do not use the battery to furnish any appreciable power except in case of emergency.

Mr. Lambert: We follow that practice as near as we can, but in our main office, for instance, where the load may run up to 650 or 700 amperes during the busy part of the day, during the night, when the load drops down to 50 amperes, we cannot afford to run a generator of that size. But we do follow that practice up to the point when the load is one-quarter of the output of the machine. With our 400-ampere generator we follow the practice outlined, down to the point of the discharge, being one-quarter of the capacity of the machine; then we throw it over on the battery and let the battery carry it, as it will do so without detriment and without loss, and the generator is cut out for the time being.

Mr. Roper: You speak of the necessity of lighting for the switchboard. Is any provision made so that the board can be lighted from the battery in case of trouble on the circuits of the lighting company?

Mr. Lambert: None whatever; we use gas. We are always supplied with candles, which the repairmen use in their work, but the gas usually answers all requirements temporarily.

Mr. Cravath: Do you ever discharge a battery near its full capacity?

Mr. Lambert: We dare not do that for fear of an accident to the power, which would leave us stranded.

Mr. Carroll: Do you find it economical to run your generator at one-quarter load, or do you do that in order to keep the reserve up to full capacity?

Mr. Lambert: We run the generator when the office load exceeds one-quarter, simply using that as a standard; the people who operate the plants are instructed that whenever the office load drops down to one-quarter, that is a signal for them to shut down. It leaves them no judgment to follow in that case.

Mr. Davis: In reference to the question of choke coils, I have observed that the practice of some engineers has been to eliminate the choke coils in the charging circuit and also in the motor circuit of the ringing generator, for the reason that when the charging generators and the ringing machines are so designed as to give sufficient distribution of the commutator segments, the "ripples" (as they might be called) on the voltage of the current are so fine as to be unappreciable. In any case they may be specially designed to eliminate this voltage vibration. Moreover, I understand that some telephone circuits are much less susceptible to this "commutator note" and such noise so that in some systems the choke coils are not used at all. In some cases generator current may be fed directly to the telephone switchboard without the interposition of the battery, although in any case the battery serves as a cushion, to take out any vibrations in the voltage such as would tend to produce sound in the telephone circuit, besides, of course, serving as a reservoir of power.

Mr. Carroll: Mr. Davis speaks of eliminating the choke coil from some circuits. I think this can be done. A good many circuits are operated in the way of what you might call retardation cord circuits, and give very little trouble from generator noise even without choke coils, whereas the repeating coil circuits are a little more susceptible to the changes in voltage. With the retardation coil these fluctuations do not make much difference, and you notice very little trouble from the commutator without the choking coil.

Mr. Lambert: I would like to ask a question for my own information. If we eliminate the choke coil system, and to take the place of that we take off a circuit which I will assume has retardation in it—an impedance coil—it would simply mean that this circuit could be used perhaps connected together or branched off so as not to get any pulsation force on the battery. We have no loss of power in putting in a choke coil, and if it meant that we had to put retardation coils in each branch, it seems to me it would be more economical to put this in instead of others.

Mr. Carroll: In the retardation coil circuit you refer to, the retardation coils are placed between the battery and each cord circuit. There would be a retardation coil for every circuit, but not directly in the talking circuit. Those coils have to be in there anyway, and are generally used as relays; they are wound quite high, 200 to 400 ohms. The talking current is fed through these relays and they not only act as a retarding effect to keep the battery from short-circuiting the circuit, but the two results are accomplished with the same coil.

Mr. Davis: There is one question which might be regarded as of rather minor importance, and that is the calculation of the size of the discharge leads to the exchange from the battery. In one office I know of the practice has been to allow a total drop of one-half volt from the battery to the subscriber's operator's position most remote from the battery. This maximum amount of drop is limited by its tendency to cause "cross-talk" if there is too much drop in voltage. Moreover, this calculation of the size of conductor is usually checked by not permitting a greater resistance than one-quarter ohm for the discharge leads. The reason for this is perhaps similar to the one regarding cross-talk. As for the drop in voltage, it is, of course, not allowable to let the voltage drop enough to interfere with the actuation of the relays, which would depend on the adjustment for certain voltages.

Concerning this calculation of the size of discharge leads, I should like to ask what has been the practice observed by Mr. Lambert?

Mr. Lambert: I believe I am right in saying that the telephone practice has found it is not quite so much the resistance of the leads as the retardation that produces the cross-talk. We tried an experiment at the "Canal" office, where we introduced a good deal of resistance and found no trouble from resistance. But we are adopting the practice now of using lead covered cables instead of rubber covered, in iron conduit, the latter having a tendency to increase the retardation effect. I had occasion to measure the drop in the leads in the "Harrison" office (which I think has rather the longest leads between the battery and fuse board of any office). I found there that under a discharge of 480 amperes we had approximately 0.25 of a volt drop.

Mr. Roper: I would ask how much voltage variation at the fuse board is permissible?

Mr. Lambert: In practice we try to never let the battery get below twenty-two volts. We seldom run above twenty-seven volts at the bus bar, and occasionally have to run within closer limits. That has been brought about particularly on account of the earth currents. Between two of our offices we had considerable trouble during the day in regard to signaling. This necessitated keeping our voltage at "Harrison" office to a point about twenty-seven volts, but since then the introduction of the "keyless" trunk system, without a return ground has given us a wider margin of operation.

When the street car systems are in full operation, then the earth currents are disseminated, and the effects are not felt quite so much. But we try to keep the voltage within reasonable limits. In the day time, when the sunlight is quite bright, we have to have our lamp signals good and bright.

Mr. Thiess: Referring to the discharge of 480 amperes at "Harrison" office, the question in my mind is, what is your normal ampere hour discharge rate per call, and how many calls per day do you figure in designing your battery for the exchange?

Mr. Lambert: Roughly speaking, we use about one-tenth of an ampere per complete connection, but that does not always include everything that goes with the load. In regard to the other question, I cannot at present give the exact information.

Mr. Reid: In regard to the retardation coil in the charging circuit of the telephone power plant. While several people have taken up the various points of retardation, Mr. Lambert, in his discussion, has taken up the repeating coil or shunting-out system which the "Bell" company uses. Also Mr. Carroll has mentioned the retardation soil circuit. There is considerable difference in the two circuits. One seems to be used by the Bell company exclusively, or Western Electric Company, and the other by the opposition companies. The noise from the charging generator on the Bell system is much more noticeable than on the Independent, or Kellogg, Dean or Stromberg-Carlson systems of retardation. The battery of the Bell systems is fed to the subscribers' instrument from the center of the repeating coil, and in the other systems the battery is fed out on the line through relays which act as retardation coils, the talking circuit of any two lines being connected on the tip side by a condenser and likewise the sleeve side. The retardation coil in the charging circuit of the ordinary telephone battery is not necessary in the Independent systems. In fact, we take a standard generator with a standard number of segments in a commutator, and it serves the purpose for charge and discharge at the same time, without any interference from generator noise, while on the Bell system it is hardly possible to do this without the generators being specially wound.

Of course we in the opposition field buy entirely (unless for special cases) the standard generator with the standard commutator, and we have no trouble whatever from cross-talk or noise due to the generator, unless the commutator gets into bad shape.

In regard to the charge and discharge of the telephone batteries, I will say that we, in the opposition field, figure a battery large enough to run the exchange, and such accessory apparatus as is necessary to run off of the battery, for a period of twenty-four hours on an eight-hour charge basis. By the eight-hour charge we mean we start up in the morning, charge and discharge the battery at the same time, and at the end of the day the batteries will be charged ready for the night load.

Mr. Lambert remarked that the current consumed at one call was about one-tenth of an ampere. From actual readings taken from the ammeter for every ten minutes during twenty-four hours, and a peg count taken of the number of calls, we find that about 0.006 ampere hour per call is a good basis upon which to figure for the telephone storage plant. The number of calls per line per day, would vary, according to the requirements of the exchange. Ordinarily we figure anywhere from ten to fifteen calls per line per day, and the storage batteries are figured to run for a period of twenty-four hours. The charging generator is ordinarily figured sufficiently large to charge one set at its normal eight-hour charging rate. In other words, making it necessary to charge eight hours per day.

In regard to the drop in line, as mentioned by Mr. Davis, I will say that on a retardation coil circuit, the drop in line from the storage battery to bus bars, or to the telephone operators' positions, is about one-fourth volt; it is not good practice to allow this drop to be greater than that, and of course the loss on the line would depend upon the operation of the circuit entirely. I know it is standard with a number of companies to test out the exchange line and coil so the relays of the system will operate through 1,000 ohms, and will fall back with 10,000 ohms constantly on the line. That gives a good range of operation.

In regard to the change in voltage; the lamps are so designed by a number of miniature lamp manufacturers that they will stand variance in voltage due to charge and discharge. It has been my experience in storage battery work that about the time you get the battery up to a voltage of about twenty-seven volts, the specific gravity of the electrolyte would be about 1.210. I notice that Mr. Lambert remarked that they would start to charge when the load became one-fourth the rated generator rate. In the opposition practice I am free to say we do not watch where they commence to charge with the generator, and I do not think they figure the battery quite so close as in the Bell system, because the Bell people shunt out the supervisory lamps, while in some opposition systems the lamp circuits are opened. The result is the opposition system is much more economical from the standpoint of cost of maintenance than the Bell system; consequently they do not pay so close attention to first cost, and do not have to figure the batteries so low. In fact, with a large plant the power is not very expensive.

In regard to ringing machines, where pulsating current is used; in the opposition system a ringing machine that will develop 125 watts will handle an exchange of 10,000 lines.

In regard to the retardation coil in the motor end of the ringing generator circuit, that used to be used in Independent practice, but was afterwards abandoned because the commutation became better, and a standard ringing dynamotor operated direct from the battery in standard practice among the telephone companies at the present time.

Mr. Carroll: I would ask what the practice is in furnishing generators according to the size of the plant. It seems to me, in order to get an economical output in the generator, in starting the generator the battery load and the load on exchange will be about the full load; so, when the exchange load increases, it will decrease the amount in the battery, and I think a great deal of economy can be had by forcing the generator in that way.

Mr. Lambert: That is exactly the practice we try to maintain. With reference to the extraordinary size of plants used by some companies one thing must be taken into account, and that is, excessive rent in the down town district, which it is not necessary to pay in the outlying territory. In the latter case a different practice is followed. It would be of great advantage in such offices as our "Harrison" office to add extra floor space.

Mr. Reid: I can easily see how the question of rent or floor space might cut considerable figure. Undoubtedly it would be just as economical to take the current direct from the generator, possibly even more so, especially if you could use the current direct from the generator and allow only the surplus that the generator is putting forth to charge the battery. In a small exchange, after the 6 o'clock peak, a small battery down town would carry load until such time as the force was around in the morning, and in that way I can easily see why they would adopt such practice. I should think it would be a good thing where rent is high. Of course, in the ordinary small town exchange, rent is of secondary consideration.

You stated that you had several forms of power to take from, but in the ordinary small exchange of 2,000 subscribers it would hardly be policy to take a chance with a local electric lighting company. If you had a battery of sufficient capacity to carry the load for a period of twenty-four to forty-eight hours, an exchange would be comparatively safe as I have noticed that generally within twenty-four hours a man can always do something.

Mr. Lambert: In our main office, through some accident which we could not control, we ran that plant for

about three months, when I think if our power plant had been shut off for twenty minutes we would have been stranded.

Mr. Reid: I think under those circumstances if you would reduce your battery to such size as you mention, if the source of primary power did go back on you (if for only twenty minutes during five years) you would find that a reserve source battery to carry the plant for say twenty-four hours, would more than pay interest on the money invested in the plant.

Mr. Roper: I think that today the supply of power has considerable influence on the size of the battery. In the down town district the telephone exchanges are supplied with two or more independent sources of current; (that is, independent sets of mains or feeders) so that trouble in one lighting main will not entirely disable the telephone exchange. In addition, the lighting company carries considerable reserve of its own to maintain its own service free from interruption.

Mr. Davis: This meeting has dealt with a subject in which I have been greatly interested for several years. Though it seems to have received very little attention from engineers in general, I have taken much interest in some of its many-sided problems.

The interesting character of telephone power is found in the wide and inclusive nature of the problems confronted by the engineer in a field where one would casually expect to find little of interest outside of very narrow limits.

We sometimes hear the learned discussion of general power engineers concerning questions of high voltages, resonance effects, line surges and multikilowatt capacities, and marvel at the splendid achievements of these men of genius. Has it not been well demonstrated in the valued paper and ensuing discussion here tonight, that in telephony we have the essential elements of many of the great problems generally ascribed solely to the "larger field?"

General telephone power practice involves in one system or another a great variety of power apparatus among the more common of which are batteries, dynamo-electrical machinery, power switchboards and prime movers, such as gas and steam engines.

In the design and operation of certain types of harmonic ringing generators, problems concerning capacity and wave form had to be solved.

The absolute necessity for due regard for balance in general telephone circuit design will be recognized at once by all telephone engineers.

Although many of the absolute values concerned are relatively small, still these various problems exist and must none the less be solved adequately in each case, in order to insure a telephone system at once practical and efficient.

INTERNATIONAL BULLETIN NO. 6.

From the new headquarters in Chicago, under date of November 20, the International Independent Telephone Association issues the following:

New Location: The association is now "at home" to the Independent telephone people at its Chicago headquarters, 629-30 Monadnock block. You may be sure of a hearty welcome if you will drop in on your next visit to the "Windy City."

Convention: Plan now to attend the 1908 annual meeting January 21, 22 and 23, at the Coliseum, Chicago. No previous engagement should prevent your presence on this important occasion. We want to make this the most successful convention to date, but to do so we must have the active co-operation of every Independent man in the field. Don't be satisfied with merely attending yourself; do a little missionary work in arousing your associates to the necessity of taking an active part. Remember, that it is *your* convention, that its deliberations may have a vital effect upon your personal interests, and that its success rests upon the individual efforts of every operator in the field. The officers of your association must have your assistance if it is to be a success. Bear this in mind, and begin at once to work and plan for a good attendance at the 1908 convention.

Convention Representatives: We call attention again to the importance of state and provincial associations electing their delegates and alternates to the convention without delay and reporting the same promptly to this office.

Program and Committees: Most of the officers of the various associations have already responded to our request for program suggestions and names of members for convention committees. The others should do so immediately. Suggestions will also be welcome from anyone in the field regarding subjects for papers and discussions, as well as special features. Give us the benefit of your ideas.

Convention Advertising: Telephone manufacturers, supply dealers and others, who have been asked to co-operate in a plan for advertising the convention and who have not yet responded, are requested to let us hear from them without delay. It is only a short time until the convention, and the greatest possible amount of publicity is necessary.

Exhibit Space: The Electrical Trades Exposition Company requests us to announce that while it has already signed up many contracts for exhibits there are still a number of desirable positions not taken in the telephone section, which can be secured by early applicants. For terms and prices address Homer E. Niesz, manager, No. 1006 Monadnock block, Chicago.

Special Notice to Operators: The association furnishes all Independent telephone manufacturing or supply companies with trade mark equipment "Shield" stamps in denominations of one cent, for use on instrument, and twenty-five cents and fifty cents for switchboard sections, the latter to be applied at the rate of one cent for each drop. These stamps on the equipment you purchase are evidence that your dealer is contributing to the support of your association.

The District and State Associations: There are undoubtedly quite a number of Independent operating companies in the organized states which are not yet members of their respective district associations. The officers and members of such associations should devote their energies to bringing in these non-member companies, for the good of such companies themselves and with a view of strengthening the state organization. A little personal effort on the part of the officers and members will accomplish results of lasting benefit along this line. Take the matter up at once and see how many new members can be enrolled before the convention. Work could also be done to good advantage in organizing new territory. The association will be glad to co-operate with all interested in forming new associations, by submitting detailed plans, suggestions, etc.

Shield Bargains: Up to date managers who appreciate the value of a strictly high class modern illuminated sign, one that compels public attention and secures increased business, while at the same time enhancing the appearance of an exchange—and which, for a limited time, may be secured at small cost—will do well to write for particulars regarding colonial lanterns before our present generous offer is withdrawn. Address the Chicago office.

The annual convention of the Nebraska Independent Telephone Association will be held in Lincoln, January, 15, 16 and 17, 1908, at the Lindell Hotel.

Nebraska sent representatives to three adjoining state conventions last year, and has the promise of a good attendance from each of them in return at the coming convention. The association has been very successful during the year and feels assured the 1908 convention will be the most enthusiastic ever held in the state.

HOW TO JUDGE TELEPHONE SECURITIES

Address to be Delivered by the President of the International Independent Telephone Association Before the Missouri Bankers' Association

By Theodore Gary

IT is needless to say that telephone securities are not all good, no more so than are all farm mortgages, railroad, municipal, or any other bonds or securities. There are good and bad; there are some better than others, and to judge telephone securities requires much the same ability that is required in judging any other securities. About the same general business rules apply to the telephone business that apply to other businesses. However, there are some exceptions and advantages.

One advantage telephone securities have over other public utility securities is that the telephone requires a less investment per capita than any other public utility, therefore the interest charge necessary to serve a community is less, while the earnings from the telephone are more uniform, yet as sure and safe as the income from water, gas, electric light or street railways, since it has been demonstrated that the earnings of the telephone are less affected by the seasons and unfavorable crop or financial conditions than any other business. Its growth has been steady for thirty years, and will not let up until every dwelling and business house is supplied with one or more telephones—branch exchanges, residences equipped with intercommunicating apparatus, the whole so connected that communication can be had with the main exchange. Until such a development has been attained, there can be no let-up in the expansion.

The growth of a telephone business necessarily implies increase of plant and investment. The growth has been so rapid that funds could not be supplied from the net earnings. The necessary increase of investment has had a tendency to disturb, since some telephone plants financed at one period soon find it necessary to re-finance the business, in order to take care of immediate needs, the result of rapid growth. Rapid expansion is generally considered a point in favor of a business, but growth of the telephone business has had a more or less depressing effect on investors.

One of the principal components of a good business is the volume of desirable, paying patronage and one that will increase. The telephone business fills this requirement. I doubt whether anyone contributes to anything more regularly, or will do anything more certainly in the future, than pay telephone service bills, hence the very first requisite is apparent.

The question of probable profit enters into every proposition. The telephone is no exception. It is just as possible to sell telephone service at less than cost as it is merchandise, manufactured goods or wheat. It is as essential, in judging telephone securities, to know whether the rates admit of profit as in other business. An authoritative opinion can be had as to what an adequate rate should be, under given conditions, with as little trouble as would be required to ascertain ordinary information about any security, therefore this question can always be settled beyond a doubt, and should be before any right judgment can be had on a telephone security.

The personnel of the telephone business is as important as it is in any other business. The quality and plan of construction are important. If the plant is well built the depreciation will be less than if poorly built, and if well planned, loss from displacement is reduced to a minimum. Depreciation is as certain in a telephone plant as in a building, a manufacturing, gas or water plant. A safe deduction to cover replacement can be ascertained from many sources, so this item can be intelligently decided by the average man.

Depreciation ranges from two per cent per annum on portions of a modern plant to five and ten per cent on other portions. Depreciation of the old type of construction of plants has generally been much heavier because the construction has been inferior and not well planned. A great factor in the telephone business in the past has been the displacement of equipment, not because it had become obsolete or incapable of being operated, but on account of the plans not being laid out on broad enough lines. Plants that were originally laid out and built for 500 telephones now have 3,000 telephones. The equipment and wire plant were planned for 500 telephones, could not be increased to take care of the growth by adding to the old plant, and it was necessary that entirely new apparatus be installed and larger and heavier pole lines erected. This has been the experience of hundreds of companies started years ago.

Perhaps the most vital point in judging telephone securities is that a rate that would admit of a profit for a plant with 500 telephones might not be a profitable rate for a plant of 1,500 subscribers. This rule is just as well settled in the telephone business as is the rule that the greater amount of business done in a wholesale business or manufactory reduces the cost.

When estimating the value of telephone securities, due allowance must be made for the increased cost per telephone with the size of the exchange. This sometimes causes doubt as to the real value back of securities, especially if the cost is known of a telephone plant, say with 500 lines, which would probably be between $25,000 and $30,000. With the knowledge of the cost of such a plant one would naturally conclude that a telephone plant with 1,500 subscribers could be built and put in operation for three times what a 500-line system costs. While this is logical reasoning, the facts are that the cost would be increased from $30 to $40 per station, and instead of such a plant costing $90,000, it will cost nearer $150,000, while a plant with 10,000 telephones will cost upwards of $2,000,000, or more than $200 per station to install. Again, it might be known that a plant with 500 subscribers earned $10,000 a year gross, and $5,000 net. One would logically reason that by increasing the plant and investment three times, say to $90,000, the gross income would be $30,000, and the net income $15,000, but experience has fully demonstrated that a telephone plant cannot be increased from 500 to 1,500 telephones by trebling the investment, nor will a plant with 500 telephones that is earning $10,000 gross, or $5,000 net, yield $30,000 gross or $15,000 net by increasing the number to 1,500 telephones, unless rates have been increased.

In figuring the value and cost of a telephone plant, the cost is much more than the visible physical plant, since cost necessarily includes putting the business on the books—to use an insurance term. About thirty per cent more telephones must have been installed and taken out and reinstalled before an average can be attained. A telephone

plant is much like a large bridge. Before the bridge can be swung heavy false work must be erected. After the bridge is completed the false work is removed, and the completed structure remains, but all know that the cost of the bridge proper carries the cost of making the bargain and erecting and removing the false work. So it is with a telephone plant. The cost is more than can be seen.

In judging a telephone security, permanency and efficiency of equipment must be taken into account. The telephone business of today is handled with one of three systems; the magneto system, or mechanical signaling; another in which the receiver is simply removed from the hook which signals central, called common battery system; the automatic that does away with the necessity of operators. In this system the subscriber manipulates his own connection. There is a fourth system just being perfected, where the ordinary central energy telephone is used, and the operator at the central office takes the number in the usual way, then manipulates keys, very much like an adding machine, which puts in motion an automatic system in every essential. With this system it is claimed that one operator is able to take care of many more lines than with the manual systems. These four systems are all good and will be used permanently. The magneto is best for the small exchange. It will stand more punishment, requires less skill to operate than either one of the other systems and therefore is particularly desirable for exchanges ranging up to 1,200 to 1,500. Above that number either of the other systems is better.

One of the Bell subsidiary companies is now offering to sell its switchboards, telephones and all equipment to the Independents. The Independents have half a dozen or more manufacturing companies building equal or superior equipment to that used by its competitor. Another factor in any business is competition. Competition in the telephone business has not proven a drawback, and does not endanger the existence, either, of the opposing properties. There is more business in the country today than the combined interest of the forty-five Bell companies, the ten thousand Independent companies, and hundreds of mutuals can take care of, and the experience of more than fifty of the principal cities and towns has demonstrated that two systems can be profitably maintained to a great advantage to all concerned. Telephone competition is always limited to two systems, and there can never be general competition. Before the advent of the Independents it was thought that the telephone was a natural monopoly, but experience has proven the contrary. There are more Independent telephones to-day than there are Bell, by a million. The Independents are organized into a system, the ownership resting with local people and thousands of local stockholders, while the Bell is financed principally in the large centers and is handled in the east. Each draws from entirely different fields for funds. The Independent companies have had a decided advantage over the Bell on account of local financial influence. There is a place for two telephones in almost every community of 10,000 population and up, occupied by a Bell company, because it generally fails to develop a territory. Competition is desirable unless there is a development by one company of one telephone to five or six persons in the community. With full development there is very little room or demand for competition.

It is known that the directories of thirty cities that have competition show that the duplications are less than eleven per cent, showing that two telephones are not an absolute necessity unless subscribers wish to reach every one that has a telephone. In St. Louis, prior to competition, there were about 12,000 telephones, a development of twenty years. Five years later, with competition, the Bell claims to have 40,000 and the Kinloch 30,000 telephones. In that city the directories show duplication of about thirteen per cent. Therefore, it is plain to be seen that both telephones are not required unless the subscriber wishes to be in communication with all the telephones in St. Louis, since he can have many more connections with a larger percentage of the whole population in either system than he originally had. The same condition is true in Kansas City. Five years ago, before competition, the Bell had about 9,000 subscribers. At this time each company has 19,000 subscribers. Since competition the field has been developed very rapidly, and the percentage of telephones in use in each system in proportion to the population is greater that when there was no competition. Duplications in Kansas City are also about thirteen per cent, and here, too, no one could say that it was necessary to have two telephones, provided he was satisfied with the limited service of one system which is much larger than he had before competition.

Take the city of Chicago, for instance, without competition, with about 100,000 telephones, with more than 2,000,000 population. There should be half a million telephones in that city, yet with one system that territory has never been developed, nor will be without competition, and there is plenty of room there today for another plant equally as large or larger than the present plant, with practically no duplications. This is the history throughout the United States. Therefore, the question of competition need cut no figure in judging telephone securities.

When a business has demonstrated its ability to thrive and live through the development stages, it certainly ought to be considered a good basis of security. That the business cannot be permanently injured by incompetent local management or temporarily poor service has been shown time and again. And almost every plant has passed the one man period.

The growth of the telephone business carries with it increased cost per station for installing, an increased cost per station for operation—statements almost unexplainable to the average man. Investors not understanding that there is such an increase have had suspicions that much of the new capital, provided ostensibly for extensions, has gone for replacements. That the larger plant costs more per station, both to install and operate, has mislead inexperienced men, and naturally left the inference that there is no profit in the business.

Perhaps the most important feature in connection with the telephone business, and which has been a stumbling block in taking care of the financial end of the business, is making provision for future growth, since it is well known by the experienced men who finance and operate telephone plants that there will be growth from time to time—growth too large to be taken care of out of net earnings—that provision must be made so that securities can be drawn from time to time under proper conditions and restrictions that will safeguard the securities issued, to supply the needed, added capital, he will provide something on the following plan. To illustrate: A wishes to bond a telephone plant for $50,000, in a city experience has taught will finally require an additional investment of $100,000. These bonds may be issued for a term of twenty years, being provided in a mortgage authorizing and securing $150,000 bonds, $50,000 of which are to be issued and the proceeds used in connection with the first construction. The unissued bonds are deposited with a trustee. The mortgage provides that additional bonds may be drawn from time to time to reimburse the company to the extent of, say, ninety per cent for money actually expended for extensions and permanent additions to the plant. The experienced operator knows that provision authorizing additional bonds to be issued must be preserved to insure the safety of the investment.

Some companies have given away stock bonuses at the beginning of their business, and investors have been shy, when considering bonds and full paid stocks in the same

companies. When this condition is found it should be no grounds for alarm, unless you are asked to consider such stock as a basis of credit. And, then, it might be true that it is proper and reasonable to issue stock as compensation to those originating, executing, financing and finding a place to build up a telephone business. That such stock issues may be legitimately paid up, as if actually paid in lawful money, is a well recognized fact. While at first such issues may have only speculative value, since the value must be made, and while such stock is issued in anticipation of the increased value of a property, and in payment of the legal and special services rendered. this class of stock generally carries the equity in a property and frequently every share of such stock is worth par or more. Such issues may be just as legitimate and sound as in cases where a bank with $50,000 capital, earning thirty per cent per annum on its capital stock, paying its stockholders ten per cent dividends, and setting aside twenty per cent to surplus fund, until at the end of five years the surplus fund amounts to $50,000, or as much again as the capital stock, then if such bank should issue $50,000 stock in lieu of the surplus, would anybody say that such stock was watered or that its stock was unsound and the bank unworthy of confidence? Any telephone company might make its stock good by a similar process. The facts in such a case must be considered since the presence of such an issue does not necessarily imply no real value at a later period.

To sum up, the only questions to be considered to arrive at right judgment in estimating telephone securities are those in connection with the plant itself. Is the field good? The personnel right? Rates adequate? Are provisions made for taking care of the future growth? Is the plant well built physically? Is the depreciation being taken care of by present expenditures, and a reserve fund provided for that purpose in the future? Is the earning sufficient to make the business profitable?

Stability.—If there are any questions in anyone's mind on this point, let him consult his monthly telephone bill and past experience, and try to figure out when his telephone service is to be discontinued.

Competition.—This necessarily will be limited to two systems, which really amounts to no competition, so this point can be treated as settled.

Prospect for Increased Business.—The demand for telephone service has been unfilled for thirty years, and all the companies in the field to-day cannot fill the demand. There are towns of 4,000 population with more than 1,000 telephones in use in one system in this country, or one telephone for every four persons in the town. A thirty years' experience ought to be a good guide. We now have eighty million people and six million telephones. We should have twenty million telephones, now, with the increase in population. This should settle the prospect of increase.

Apparatus.—Abundant of efficient apparatus can be had from more than thirty separate Independent manufactories, and the Bell subsidiary manufacturing companies offer to sell anyone the same apparatus as it uses. So there seems to be no possible danger from this point.

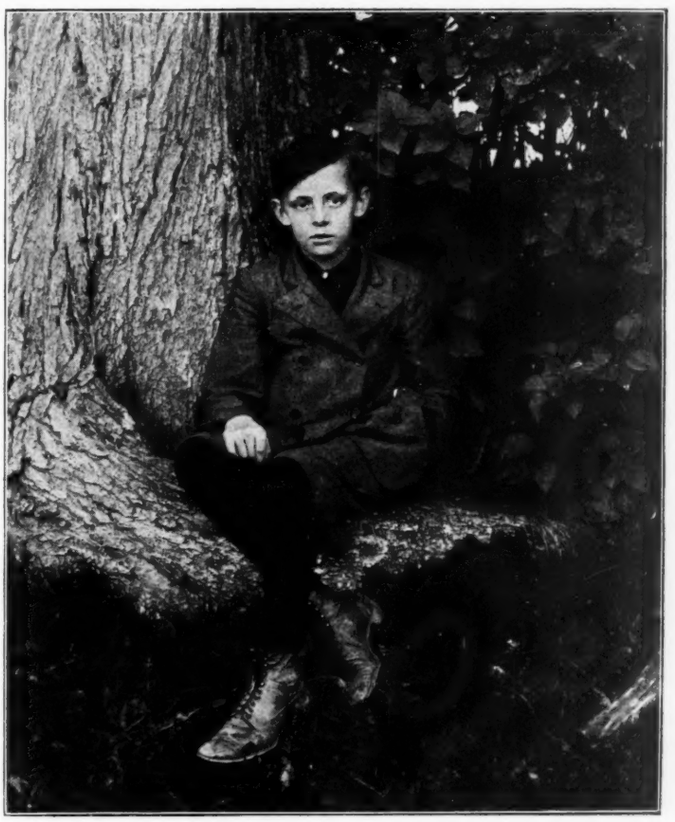
Danger of New Invention to Endanger Present System.—No great changes have been made in either the magneto or central energy system in the past five years. During that time the automatic has been perfected, and all systems are in use and will undoubtedly continue. No wireless telephony can ever be made a commercial success, is the opinion of no less an authority than Edison. So in judging the value of telephone securities this feature can be safely passed.

The Bell has decided to replace with girls all the boys now employed as operators at night at Worcester, Massachusetts.

A YOUNG TELEPHONE OPERATOR.

Patrons of the exchange at Rindge, New Hampshire, believe that they have the youngest telephone operator in the world. Master Oscar Parker Thrasher, nine years old, is the one in question, and as he has worked at the switchboard, off and on, for two years his friends claim he was an operator when only seven years of age.

Ned Thrasher, his father, is the manager of the local exchange, and a leading citizen of the little town of Rindge. Mr. Thrasher is said to hold more positions than any other man in the state of New Hampshire. He is justice of the peace, notary public, trial justice, or judge, for the township of Rindge, proprietor of a hotel the Thrasher House, owner of the largest livery stable, and United States mail contractor, which includes the carrying of the mails from the depot to three postoffices, and star route and rural delivery. He is also fire warden, a member of the historical committee, and special agent for the Humane society, proprietor of a stage line, and a farmer. He has held the positions of postmaster and tax collector, and for twenty years was a member of the state Democratic committee. Mr. Thrasher is an inveterate story teller, and one of the most companionable and genial men of his state.



Oscar Parker Thrasher.

Young Oscar, who is shown in the accompanying illustration under one of the big ash trees of the Thrasher place, is an exceptionally bright boy, both in and out of school, and is noted for his industry and originality. He had little difficulty in mastering the duties of telephone operator, and during the summer vacations he spends about half of his time at the switchboard, but during the winter, of course, he is unable to give more than an hour or two a day to the telephone work. Oscar takes a keen interest in his telephone duties and the subscribers say he attends to them in a most satisfactory manner. The central office of the telephone company is located at the Thrasher House, in the center of Rindge village, Rindge being six miles north of Winchendon and twelve miles southeast of Mount Monadnock.

SELECTIVE PARTY LINE SYSTEMS

A Discussion of the General Requirements to be Met in Equipping an Exchange with Selective Apparatus

By H. P. Clausen

THE party line telephone has come to stay, and it is rare that one finds an exchange manager who will install a switchboard which is not arranged in some manner for selective signaling, even though the exchange is not immediately equipped with selective telephones.

With regard to the different systems available for selective service, we have several types to choose from, the most important being those systems in which alternating currents of different frequencies are used for operating suitably constructed signal receiving devices. These systems have been introduced, thoroughly tried out, and are being universally applied. The oldtime positive and negative current biased bell systems appear to find some favor, particularly in local battery exchanges, and may be made to operate fairly satisfactorily, particularly when the ringers are adjusted for a higher voltage signaling current than was applied in the earlier days of the party line system.

In addition to the two systems of selective signaling above outlined, we still have the old plan of divided circuit ringing where two telephones may be connected to a pair of line wires and permit the rendering of a selective service through connecting the signaling device of each telephone to earth from the tip and sleeve wires. Thus, while signaling over the tip wire, the telephone ringer connected to it responds to the exclusion of the ringer connected to the sleeve wire and, vice versa, a signal may be projected over the sleeve wire and operate the bell to the exclusion of the signal belonging to the telephone which has its ringer connected to the tip wire. Thus we have the three chief systems of selective—the divided circuit system, the plus and minus systems, and the different frequency systems.

In discussing the question of installing selective apparatus in an exchange installation, it is pre-supposed that the reader understands the operation of the different types of systems, and therefore no detailed description will be given of the operation.

One of the first considerations which will be given attention will be the question of determining the local circuit conditions, that is, is the switchboard being operated upon a common return or grounded basis, or a metallic system, and, perhaps, we have a mixed system of metallic and common return lines.

With a common return system it is not wise to attempt the installation of any extensive selective system for the usual inductive disturbance between common return lines are only aggravated when we install selective signaling equipment in such an exchange. If the different frequency system is installed, it is certain to result in an interference between lines over which a conversation is passing owing to the projection of the different frequency signaling currents over adjacent lines. This question of interference is not avoided to any particular extent by installing the plus and minus selective systems—which might be done for the purpose of operating a two-party selective service.

Regarding the divided circuit, obviously we have only one wire to work with and we cannot secure anything more than a single party signaling service. In case, however, certain lines in the exchange are metallic circuit and other lines common return, then it is perfectly feasible to operate selective telephones upon metallic lines, but the objections enumerated against installing selective apparatus upon comman return circuit must remain. From this it will be observed that when we are operating a mixed system it is perfectly feasible to install selective signaling appliances and operate only the metallic lines upon a selective basis. It should not be understood, however, that, say, with the different frequency system, it is not possibe to give two and even four-party selective service over grounded or common return lines. It can be done, but it is simply a question of how much noise the telephone users will put up with.

If a switchboard has been arranged for metallic service and lines connected to it are constructed upon a metallic basis, then we may operate any of the different selective systems whether they require only the two metallic line wires for the signaling service, or whether they require the earth return in combination with the two metallic line wires.

In order to discuss the requirements, let us first consider the application of a divided ringing circuit system to an existing exchange equipment. As has already been explained, in order to operate a divided circuit system, the signal bells of the two telephones connected to a metallic line circuit must be connected to earth. Telephone No. 1, we will say, connects from the tip wire to earth, and the signal bell in telephone No. 2 connects from the sleeve wire to earth. Now, we must arrange the switchboard with means which will permit any operator to signal over any line either for the No. 1 or No. 2 telephone. When a board has been provided with keys in which a single lever has been installed and arranged for signaling out metallic over the calling cord only, then we are required to install a master key in each operator's position, so arranged that the position of the master key will determine whether the signaling current is being sent out over the tip wire to earth or over the sleeve wire to earth, and possibly, under special operative conditions, a position of the key will establish a circuit condition which will permit projecting the signaling current over the metallic line to the exclusion of a ground connection. This is a point which must be carefully gone into when considering the installation of divided circuit ringing system. It is best in such systems to connect the generator permanently to earth. Then it will simply require a shifting of the generator connection from the tip to the sleeve wire in order to permit projecting the current over the desired line wire, for it will be observed that we cannot very well keep the exchange generator from being practically permanently grounded. Of course, the position of the master key might establish a circuit connection which will leave the generator clear from earth, but observe that when this is done every master key in the entire switchboard must be on its metallic ringing position, for if even one key were thrown over to the ground ringing position, the generator will stand grounded. So then, as a general proposition, in divided circuit systems the exchange generator should be grounded.

The installation of a master key is not a satisfactory method to follow when a large number of party lines are installed. It is better to install another ringing key in connection with each cord circuit so that operating the key in one position will project ringing current over the tip wire, and operating the key in an opposite direction will project a current over the sleeve wire. This is the method generally adopted, although it is still possible to utilize the

ordinary single lever ringing and listening key for rendering two-party divided circuit selective service by installing additional multiple jacks connected in a reverse manner. Let us say that telephone No. 1 connected to line No. 400 is operated by a current projected over the tip side of the line to earth. Consequently, telephone No. 2 on line No. 400 must be operated from current projected over the sleeve line wire. It will be observed that, should we install an additional multiple jack circuit throughout the switchboard, it is possible to connect this multiple jack in a reverse manner; that is, connect the sleeve wire to the tip side of the line and the tip wire to the sleeve side. If we should plug into this multiple jack and project a ringing current, obviously telephone No. 2 will be signaled. Now, it is only necessary to designate telephone No. 1, say, as No. 400, and telephone No. 2, 4,000, then it will only be necessary to mark the reverse connected multiple jack No. 4000 and there will not be any chance for error in signaling the telephones, for when the operator receives a call for telephone No. 400, the No. 400 multiple is plugged into and a signaling current projected over the tip of the line. Whereas, if the call had been for line No. 4000, the signal projected over the line will pass over the sleeve side of the line, owing to the multiple jack having been connected in a reverse manner.

With plenty of multiple space and extra multiple jacks available, the plan just outlined will answer the purpose very well, but when we are cramped for space in the multiple portion of the switchboard, it becomes necessary to install the extra position of ringing key.

It will be observed that the installation of a divided signaling system then calls for nothing more than either the installation of master keys; the installation of an individual ringing key, or of an extra run of multiple jacks. There has been no change in the equipment of ringing machinery.

When the plus and minus system is the type chosen for equipping an exchange with selective apparatus, we must provide machinery at the central office for delivering a suitable character of current. This machinery may be in the direction of a pole changer or a regular motor dynamo equipment. The switchboard positions must all be equipped with four-party selective keys, and these keys must be provided with the fifth position for permitting the projection of the regular alternating current for signaling straight line telephones. If we install a selective key in each of the cord circuits, we are required to provide each key with at least four buttons and still retain the regular ringing key. If we install only two buttons in connection with each cord circuit, so as to give us either a positive or negative pulsating current, then we can operate the switchboard on the four-party basis; if we install the extra run of multiple jacks referred to in the divided circuit ringing system, that is, if we install two multiple jacks for each line circuit, then we need only two selective buttons in each cord circuit.

We will now consider the installation of different frequency apparatus. First of all, we must provide for each operator's position a four-button master selective key, and the exchange power plant must be provided with either a pole changer capable of delivering the different frequencies of curent or a motor generator may be installed for this purpose. In exchanges where any considerable number of selective telephones are being operated, it is necessary to equip each cord circuit with means for signaling selective, for it is only when this is done that an operator is able to determine which telephone has been signaled, it being usual to provide the selective keys with indicative means showing the character of the current last projected. When four frequencies of current are used in operating the telephones of an exchange, the ringing keys must be provided with four different positions for signaling. It is common to use the lever for ringing the straight line telephones and the lowest frequency party line telephone. When this is done it requires only three buttons upon the selective key in order to raise anyone of the four parties connected to a line.

If an exchange is equipped with a two-party metallic selective different frequency current system, then we may obtain only a two-party selective service when operating completely metallic. In such cases it would call for a ringing key having two positions, but in case the earth may be used as a return circuit, we are enabled to operate a four-party selective service by connecting the signaling equipments of the first two telephones, say, from the tip to ground, and the second two stations from sleeve to ground. With such an installation we are required to provide each cord circuit with a four-button selective key or a three-button selective key, should we use the listening lever for ringing the first station upon the line. And, again, should we double up the multiple we need only a two-position ringing key, for obviously there are only two different frequencies of current, and we may connect the multiple in a reverse manner and thus utilize the advantages of installing only a two-position ringing key.

When a switchboard is equipped for selective service it is necessary to provide the line signals with means of identification. For example, some exchanges have installed and use the intermediate cross connecting board. As a rule the line circuit enters the exchange and connects to the line side of the main cross connecting board. From this point jumper wires carry the line circuit to the protector equipment, and from the protector equipment a cable connects the line circuit to the multiple and the line side of the intermediate cross connecting board.

The answering jacks and lamps, however, usually are connected to the switchboard side of the intermediate cross-connecting board, and when the redistribution of lines takes place it is a matter of chance as to what line a multiple number and answering jack with its associated lamp may be connected to. That is, multiple line No. 450 does not necessarily connect to answering jack No. 450. Therefore, the answering jack, whichever consecutive number it may be, should be provided with an identification in the form of a designation number which bears the line number. This must be done for the following reasons:

When a party line subscriber removes his receiver from the hook switch, it results in lighting the lamp in the switchboard before a certain operator. The operator places an answering plug into the answering jack and extinguishes the line signal. Now, let us say that the calling subscriber wants to speak to a subscriber whose telephone is connected to the same line wires. Without a designation mark, which informs the operator that the station called for is connected to the same line belonging to the caller's circuit, she will make the usual busy test, and, owing to the answering plug already being in the line circuit, reports the line busy, and if she disregards the busy test and simply places the calling plug in the called for party's line jack, it is quite obvious that the signaling current will be projected over the waiting party's line, who will then be inconvenienced by hearing a disagreeable noise. At the same time much damage is liable to be the result through the ringing current backing up and chattering the relays connected to the answering cord circuit, thereby introducing an undesirable service condition if not even seriously affecting the proper adjustment of the relays. The installation of designations associated with the lamp or answering jack then becomes a positive necessity.

The British colonial in the Leeward Island report for 1906-7 states in regard to the telephone service that there are 161 instruments and 290 miles of wire in Antigua, and 92 instruments and 254 miles of wire in St. Kitts.

INSTALLATION OF SWITCHBOARDS

Some Suggestions as to Methods which Small Companies Might Use with Profit in This Work

By W. J. Stanton

THE installation of small switch boards is a problem that has received as little and deserves as much consideration as any problem in the art of telephony. The art has developed to such a stage that no community can be poorly served without the inadequacy of that service being felt by every person connected with it.

The fact that such a large proportion of telephone users is made up of units, or exchanges of 500 subscribers or less, and that these units are united in one vast system by local and long distance lines, converging at the larger commercial centers, does not seem to have aroused in telephone operators or engineers that degree of attention which the importance of the subject demands. The result is, that in a large majority of small telephone plants the installation and care of switchboards and office terminals have been attended to in such a haphazard manner as to almost preclude the possibility of good service being rendered for any extended period of time.

It is the rule, rather than the exception, to find small switchboards installed in the most inconvenient, unsanitary and often most noisy office rooms to be found. This is generally caused by the instinct of economy being stronger or more self-assertive than the combination of a desire for service and a knowledge of future needs.

When the office rooms have been selected and the switchboard arrives, the "economist" is again in evidence. "We have a good man," says the local company. "We don't need to call in expensive outside help." The man may be an excellent mechanic in his line, but there are very few men working in small telephone plants who make a business of installing switchboards. He may be bright and ingenious but he lacks the experience that comes only with long practice in grappling with and solving in the cheapest and best manner the perplexing problems peculiar to every installation, large or small.

The competent exchange man, too, would often make a great deal better showing if left to himself. He generally knows what the exchange needs, and is much the best judge as to how to accomplish it, as compared with the average stockholder. But there is the interested investor, the anxious economist and the pugnacious critic, forever standing over the struggling mechanic, ready at every opportunity to apply the "thumb screw," the goad, or the "big stick" to convert Mohammedan fashion, the man who ought to know. In the end, chaos often results and service suffers.

Investors have two extremes to guard against—namely, extravagance on the part of the mechanic, due largely to the mechanic's lack of understanding or appreciation of the financial problems involved, coupled with his desire to "fix thing up nice," and "wrecking methods" applied consciously or otherwise by those directing the business policy of the company in their endeavor to "make a showing." It is the function of the telephone engineer to assist the investor to shape a safe course between these extremes. In the absence of professional advice, a few rules may be laid down, which may prove of value.

The general location of the office site is practically predetermined by conditions such as "telephone center," available office room, fire risks, etc. The actual location should be determined by considerations such as will eliminate, as far as possible, all external influences that may disturb or interfere with the service. Noise must be shut out, smoke and dust guarded against while providing for good ventilation, and light. Either ownership by the company or a long term lease should be obtained, as the moving of a central office is expensive, both to the company and the patron. Neglect of any of the above requirements is sure to prove an expensive error in the end. The writer has seen service slowed down 50 per cent during the very busiest time of the day, because of the noise in a busy paved street. The "click clack" of horses' hoofs, the rumbling of heavy traffic, the babel of voices clamoring insistently at one ear, effectively blanket the often faint and always imperfect articulation demanding attention at the other. We venture the assertion that a large number of companies have paid sufficient tribute

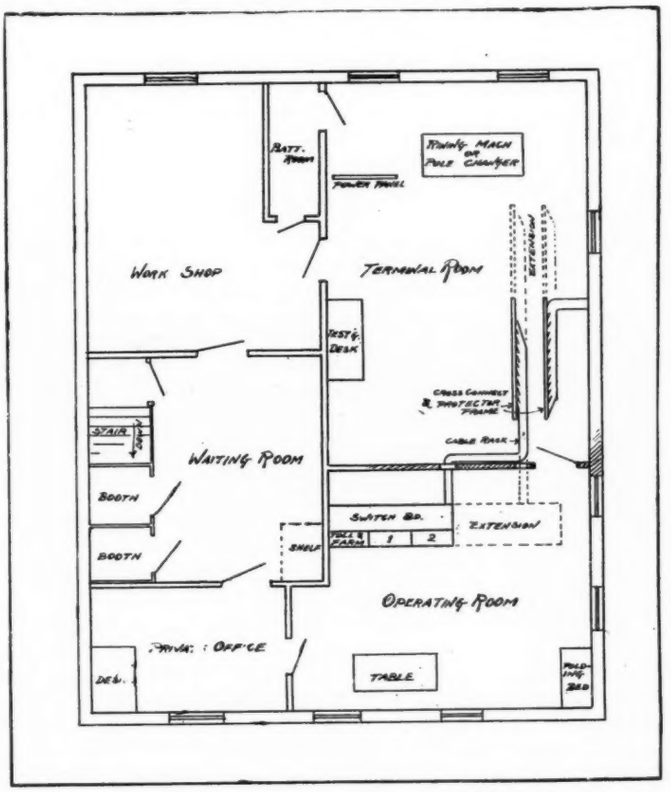


Figure 1—General arrangement of exchange.

to these disturbances to build and equip an office of their own which would be free from the nuisance. Then the smoke and the dust—both disastrous to the vocal organs upon which so much depends and both harmful to apparatus to a degree that can never be fully determined. Ventilation and light are essential to prompt and accurate service. The general comfort of operators practically determines what we might call the "tone" of the service. The health and comfort of employes, so often neglected, is a most valuable asset to any company, large or small, and forms an under current that may prove the deciding factor for the success or failure of such a project.

The internal arrangement must be determined to a large extent by the character of the equipment to be installed, and by the manner in which it is necessary to bring in the cables. Cables should be led into an office as near as possible to the distributing racks, and care should be taken to avoid expensive back-feeds. Each installation presents problems pecu-

liar to itself so that no fixed rules can be laid down. The accompanying sketch shows an arrangement that provides for both economy and convenience, etc. While it is not ideal, it is sufficient to form a basis for discussion.

The cables, in this case, are brought from the terminal pole into the office by means of a steel bridge leading through a protected opening to a point on a level with the top of the terminal frame. Inside the office wool cable is spliced to the paper cables and lead on to the terminal rack in units of one hundred or less. In a large number of cases it is advisable to make up cable out of No. 20 R. C. twisted wire, splicing it to the paper cables and sealing with a pothead filled with compound. It seems almost superfluous to caution against carrying paper cable directly to the racks, yet there are several companies we have visited who have cables connected up in this manner and who refuse to believe it bad practice because it never yet put them out of business.

In arranging the cable terminal and protector racks the protectors should be placed on the switchboard side of the frame with the carbon arresters on the inside of the fuses or heat coils. This is especially important wherever the lines are liable to become crossed with high tension circuits such as trolley lines, arc light or primary alternating current circuits. If the carbon is left on the outside of the fuse an arc forms the excessive flow of current heats the carbons and conductors and a fire is inevitable unless a conductor is burned off. On the other hand, with the fuse between carbon and line, the fuse blows almost instantly on the forming of the arc. Flame proof wire should always be used where there is any possibility of high tension crosses. The saving in this arrangement is also considerable, especially on the initial installation. It is quite a common occurrence that not over 50 per cent of the cable pairs coming into the central office are in use at the outset, while the average cable plant seldom has over 80 per cent of its cable pairs active. By placing the protection on the switchboard side of the rack an actual saving of from 50 to 60 cents per line is made on the difference between the number of drops in use on the switchboard and the number of cable pairs entering the office.

Care should be taken to solder all connections on the main frame, both cable terminals and intermediate jumper connections. Binding post or screw and washer connections may be handy when changes are made. Nevertheless, like holes in a pocket, they are things to be guarded against, as there is always more or less small change escaping by that route.

It has been the almost universal custom in small exchanges to carry the cables from the switchboard to the racks, either on or under the floor. The results of this practice have been expensive. Rats' nests and mildewed cables are frequent. The scrub woman and water bucket, water beating in through windows or doors, and various other agencies contribute to the night-mare that such practice conjures up from the memories of past experience. The best practice is to carry the cables out of the top of the first position of the switchboard on to a rack built for the purpose, leading directly to the top of the protector frame. In the accompanying sketch the arrangement is at fault as it is necessary either to bring the cables out of the third position or feed back with expensive cable. In small installations the bringing of cables out of the cabinets at more than one point is not a very serious objection. In this case the engineer has chosen the lesser of two evils by sacrificing appearances for the sake of economy in a case where the matter of service is not involved. The dotted lines show the location of the second cable run in case it is found necessary to add a second section.

The accompanying illustration, for which we are indebted to the National Telephone Journal, of London, England, shows a group of telephone operators who are members of the Swansea Operators' Telephone Society. This organization is the only one of its kind in England, and the photograph shows that the "hello" girls of England possess their full share of comeliness as well as intelligence and efficiency in their work. The male figure in the center, who is buried in this bevy of British beauty, is the manager, who is fortunate enough to be daily surrounded by such a staff of assistants.

FOILING AN EAVESDROPPER

How the Engineer, Manager and Trouble-Man Solved and Handled a Mysterious Case of Trouble on a Rural Telephone Line

By J. D. Archer

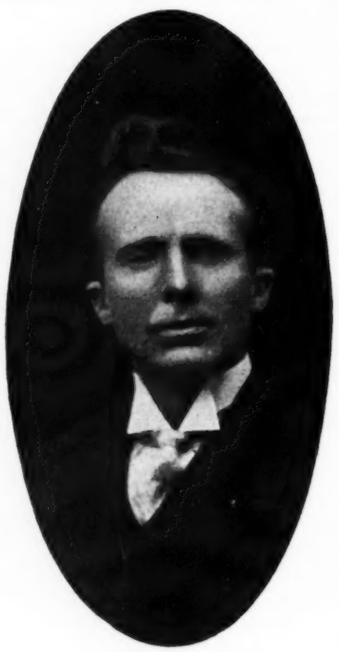
THE exchange manager sat in his office looking over some report sheets which had been placed on his desk by the trouble-man early in the morning, and he noted that most of the troubles reported were in connection with the party lines in this particular instance. Up to this time the party lines had given fairly satisfactory service, considering that this feature of the service was as yet in the experimental stage. Of course, there were the usual troubles, such as cross talk and damages due to electrical and wind-storms which so frequently swept the open country hillsides.

Suddenly there was a sound of footsteps on the stairs, the door was thrust open with a bang and the troubleman stepped in. Immediately behind him stalked a tall, burly farmer and his wife. The visitors were introduced to the manager.

"How are you, Mr. Bromsby? Glad you came in."

"Oh, I'm jist tol'able like. Can't complain."

"W'y Jim Bromsby?" broke in his wife. "Sich talk, when you know that's the very thing you came up here to do. Oh, I'm purty well, thank ye," she added, as she shook hands with the manager, "but I ain't like Mr. Bromsby there, fer I kin complain, and I 'low I'm a goin' to do some complainin' right now."



J. D. Archer.

The manager laughed goodnaturedly and asked them to be seated. Then seating himself at his desk he remarked:

"We are always glad to see our patrons and will surely do anything we can to make the service right."

"Oh, it ain't the servant we're a-worryin' about, Mr. King, for she is a tol'able fine girl an' don't talk much by th' telephone. It's someone else that keeps a stickin' of their gab in, ain't it, Jim?" said Mrs. Bromsby.

"Wa'al now I cal'late that's jist it, Mr. King," confirmed the husband.

"How many telephones are there on your line?" inquired the manager.

"There be four, ain't they, Mr. Bromsby? Jinkenses, Rollinses, Dobbsbys an' us."

"I 'low you've got 'em all, Mandy," drawled Bromsby, as he slapped his heavy boots with his slouch hat.

"Well, now, it must be some of those people who break in on your conversation," ventured the manager.

"No, no. It ain't none of them folks as does it, an' it ain't conversation, either. It jist comes once in a while, suddint like, an' makes the most horridest noise you ever heered, jist like a ravin' maniacal or somethin'."

The troubleman coughed vigorously.

"That is very strange," mused the manager. "Do Rollinses and Jinkenses ever hear these peculiar noises?"

"W'y, the Dobbsbys lives jist about half a mile east o' us, an' me an' Mrs. Dobbsby was a-talkin' by th' telephone an' that noise come all to onct, an' my! It was simply *paralizin'*. Mrs. Dobbsby she fainted *outright*, she did. Didn't she, Jim?"

"Exactly, keeled right over on the spot."

"Well, I declare. About how often has this occurred?" asked the managers.

"Oh, I can't say exactly, almost ever' time me an' Mrs. Dobbsby would git to talkin' an' laughin', as wimmen folks gineraly does, then that thing would commence, and—horror of horrors! My nerves fairly creeps yit whenever I think about it."

"By jing! I'll bet you it was an echo," broke in the troubleman, "there are a lot of high hills along that line, and I tell you when women folks get to talking into a telephone and the sound goes over a couple of hills and comes smash against a telephone receiver diaphragm there is bound to be an echo. There is no getting around it."

"Now, there you go again, Will Biggsby. Now, I've knowed you ever since you was knee high to yer daddy, an' you're always a makin' fun o' the wimmen folks when you know you couldn't live without 'em," retorted Mrs. Bromsby.

"Well, I must admit that you women do help in making work for the troubleman."

Mrs. Bromsby ignored this last remark and turned her attention to the manager again.

"No, Mr. King, it couldn't a-bin th' Rollinses or Jinkenses for they wouldn't play no sich a trick on their neighbors as that."

"The noise doesn't come from this end of the line, that's certain," mused the manager, as he chewed the end of an unlighted stogie.

"Well, where in goodness sakes does it come from, then?" interrogated Mrs. Bromsby, incredulously.

"Begins to look like a case of nightmare. You didn't hear anything, did you, Mr. Bromsby? It takes a woman, though, to hear things, whether she's awake or not."

"Now you're shoutin', young man, now you're shoutin'," roared the farmer, as he gave his right boot a resounding slap with his hat, arose from his chair and strode toward the door. Mrs. Bromsby arose also.

"Just a moment, Mr. Bromsby," interposed the manager. "We have a telephone engineer coming here to-night, and we will drive out to your place to-morrow and see if we cannot locate this trouble."

"Wa'al now I 'low as how we will be much obleeged to ye if ye do, Mr. King. We'll have to be a joggin' along, Mandy. Good-day."

Mrs. Bromsby lingered for another word.

"I hope you don't feel put out with me fer takin' on so, Mr. King. Mr. Bromsby hain't done no complainin' here, but he certainly does do his share of it at home."

"Not put out in the least, Mrs. Bromsby; in fact, I am quite curious regarding this matter and will see that it is investigated thoroughly."

"Now, I'm real glad to hear yo' say that, fer we don't want to have th' telephone taken out, fer it's such an easy way o' visitin' with yer neighbors. Good-by, Mr. King."

"Good-by, Mrs. Bromsby."

When the door had closed behind the Bromsbys the manager dropped into his chair and buried the fingers of both hands in his hair as he exclaimed:

"Gosh!"

The troubleman cocked both feet upon the top of his desk, blew a prolonged cloud of smoke into the air and held out a cigar to the manager.

"It will take a better cigar than you are used to smoking to unravel this snarl. Try this one."

"No. A stogie is good enough for me," said the manager, "as Edison says. Do you mean me to understand that you bought that good cigar yourself, Biggsby?"

The troubleman blew another long line of smoke into the air.

"Wa'al now, I cal'late you're right, Mr. King."

Just then there was another sound of footsteps on the stairway landing and again the heavy door swung open with a crash.

"Well, I'll be hanged!" exclaimed King. "Come in, Carliss. You're just the man we're looking for. Have a chair. Now, Biggsby, hand over that good cigar."

"Oh, certainly. Free as water. How are you, Carliss? Have a cigar. I offered it to King a moment ago but he thought it was too rich for him."

"Loaded?" inquired the engineer as he looked it over quizzically.

"No, no. It's a good one, that's all. Not used to them."

"Oh, I see," and the engineer proceeded to light the weed. "What is the matter now? Discovered another genius or something?" he asked.

"It's a something, this one is," assured the troubleman with a side glance at the manager.

Then the later told what was known of the matter.

"Sounds like an eavesdropper case," remarked the engineer at last. "I would like to take a look into this matter myself if I had the time."

"Take the time. It won't cost you anything while you are doing it, and we will drive out there early in the morning."

"All right, I'll do it."

The following morning a carriage was procured and the three men drove out to the Bromsby homestead. The troubleman brought the horse to a stop in front of the house, after a drive of four or five miles, and they alighted. Mr. Bromsby came around the corner of the house and, after seeing who the visitors were, came out to meet them.

"Good morning, Mr. Bromsby," saluted the manager.

"Mornin', gentlemen, mornin'. Tol'able fine day, eh?"

"Howdy, Bromsby," broke in the troubleman. "Heard any more funny noises?"

"Yep. Mrs. Bromsby heered it agin last night, an' I cal'late she pretty nigh had a spasm. W'y it was so loud I heered it myself clear over to 'tother side th' room. Yes, siree."

"Well, I swan, man, I had a better opinion of you than that. Buy good whisky after this and it won't use you that way," jeered the troubleman.

"Wa'al now, I cal'late you are experienced in such things, Biggsby, an' if you'd a sent us out some o' th' good kind occasionally, ye might a saved yourself this trip out here."

"Is the joke on me or the management, King?" inquired the troubleman as he joined in the laugh which followed.

"I guess it's up to Carliss," was the reply, as the manager introduced the engineer not only to Bromsby but to his wife, who now appeared in the doorway.

"Carliss beats the world doctoring telephones," said King.

"Well, I do hope he kin fix this one or I swan I'll throw th' plaguey thing out th' back door. I ain't a-goin' to have any nervis prostrashun if I kin help it."

"Oh, he'll fix it all right, Mrs. Bromsby, but we want to make this job last until after dinner if possible."

"Yes, I'll bet ye," railed the housewife, "I jist 'lowed to Jim last night, I bet you was fixin' up a job on me so I'd have to get dinner for you. I wouldn't be a bit surprised if you ain't bin a-makin' ever' bit o' that all-killin' noise yerself jist to git an excuse fer comin' out here to tinker around about meal time. Oh, you're a likely young feller, you aire, an' you'll never run out of trouble as long as you do th' work yourself."

"Nope. It took me a whole day to stop that cross-talk out here that time, King, and, great chopsticks, such spring chicken, and that strawberry shortcake and hot biscuits and maple syrup! Oom-m-m!" groaned Biggsby.

"Well, don't get reminiscent, Biggsby, get busy here and cut in another receiver beside the one that is in while we take a look at the lay of the land," commanded Carliss, after which he and the manager went out of doors and surveyed the line. They could see the Dobbsby home in the distance. There were no trees along the line nearer than ten yards. There were two stubble fields bordering the highway, these fields being separated by a wire fence. Beyond and across the highway lay a dense tract of woodland.

After a satisfactory survey of the place the two returned to the house. Biggsby already had the second receiver bridged in.

"We will try a little game of our own now," remarked the engineer as he inspected the telephone carefully. "Biggsby, make a charge up that telephone pole in front of the house there and disconnect the main line, leaving this telephone and the Dobbsby telephone connected in circuit, independent of the main exchange, you understand."

"Aye, aye, sir," assented the troubleman.

"Mr. King, if you wish to engage in this interesting little game, get a couple of those new batteries from the buggy."

"Yes, sir; with all possible expedition," assured the manager as he hurried out. Biggsby soon returned.

"Line is all clear, Mr. Carliss."

"Very well. Now, Mrs. Bromsby, it is your turn. Please call up your neighbor, Mrs. Dobbsby, and talk to her just as usual, as though nothing had occurred. Do not mention our being here or that anything out of the ordinary is going on. I will listen in on this receiver."

"Yes, Mrs. Bromsby, say any fool thing that comes into your mind, only be natural," urged Biggsby, grinning.

Mrs. Bromsby reluctantly took up the receiver.

"I reckon some folks is never so natural as when they are thinkin' about their stumicks, Mr. Biggsby," she retorted as she gave the Dobbsby ring.

The call was answered and the conversation went on for some moments uninterrupted, then the engineer noticed a slight clicking sound in his receiver. An instant later there followed a most indescribable and unquestionably horrifying noise.

Mrs. Bromsby dropped her receiver in abject terror, but the engineer listened on until the noise ceased and then held up a finger to enjoin silence. Then he placed his hand over the transmitter.

"Talk on, Mrs. Bromsby, talk on. I want to hear that noise again. Speak to Mrs. Dobbsby about the noise. Say anything, only talk."

Mrs. Bromsby, with much trepidation, again placed the receiver to her ear, and again the terror-inspiring combination of sounds was repeated.

"Oh, murder! Spirits of Cæsar! I'm a-goin' to have nervis prostrashun! I know it," moaned Mrs. Bromsby as she dropped into a chair.

"Here are some spirits of camphor, may be it will answer the purpose," said Biggsby.

"Oh, Will Biggsby, you do make a body sick. If you'd

a-heard that noise you'd a-bin half way back to town by this time."

"Well, now I have an idea," said the engineer as he hung up the dangling receiver. "Get my instrument case from the buggy, Biggsby, and follow me, please."

He immediately struck out down the road toward Dobbsby's, examining each telephone pole that he came to until he arrived at the one exactly opposite and in line with the fence separating the two fields. He inspected this post carefully, also the ground rod, kicking up the earth from around the ground rod stake. By this time Biggsby came up.

"Believe you've got 'em, Carliss," he panted, as he pointed to his forehead.

"I am going to get 'em pretty shortly," replied the engineer as he tugged at the groundwire stake. "Aha! What is this?" he ejaculated as he pulled up a rusty looking piece of rubber-covered wire which was attached to the groundwire. He then tore up the wire as far as the fence. Here the insulated wire was attached to the lower wire of the fence.

"Come on, fellows," he said, hurriedly, as he strode rapidly off along the fence to the opposite side of the field. Here he examined the end of the lower wire. To this end of the wire was attached a piece of smaller sized insulated wire which was stapled to the roots of a tree, and from thence was conducted upward along the trunk of the tree for fifteen feet or more, extending from there across to the trunk of the next tree. The engineer followed the wire with his eyes far enough to get the general direction and then struck off through the woods.

Biggsby came panting along behind, carrying the engineer's instrument case.

"If you're going back to town, Carliss, take your baggage," he called as he paused to wipe the perspiration from his face.

He then climbed up on the fence and sat there, watching the engineer until he disappeared in the thick shrubbery.

At length Carliss emerged from the thicket.

"Go and bring King down here right quick and there will be something doing."

"What! Got a wildcat on the line?"

"No, but there is an old woodcutter's shanty over yonder in the brush, and I think the villain is in there. We will 'cop' him."

"Bah! King's no good. Too fat. You've got a gun, haven't you?"

"Yes."

"So have I, and some twine if necessary."

"All right. You go ahead."

"Me!"

"Yes, you. You're the troubleman."

"But you're the specialist. This is your case, and, besides, you chased him in there and it's up to you to chase him out. Draw your gun, make a bold charge, and I am with you."

"Come on, then. Are you sure that gun of yours is loaded?"

"Sure. I loaded it myself three weeks ago to kill a rat in the switchboard-room."

"Hey, you! Point the thing the other way or else cut out that shivering."

"Shiver your helmet! I'm as cool as a rock."

"A Plymouth Rock, when there is a hawk around," whispered the engineer.

By this time they were nearing the shanty. Carliss held up a warning finger.

"Be quiet now."

"Oh, if there is any noise made from this on to the finish you will make it. It would take a foxy mouse to beat my grade of silence," whispered Biggsby.

They crept around the corner of the shanty to a door. Carliss cautiously pulled the door open a little way and peered in.

Suddenly a man sprang up at the opposite side of the room and touched a spring above his head, whereupon a heavy trap-door came banging down immediately in front of the engineer's face. Then they heard footsteps scurrying through the underbrush beyond the shanty.

The engineer ran around the corner of the cabin and discharged two chambers of his pistol into the air in the direction taken by the fleeing culprit.

"You fool! Do you want to kill someone?" queried Biggsby, excitedly.

"Oh, no, just make him think he had a close call so that he won't be trying the same game again to-mororw."

They searched the cabin and secured the apparatus, which consisted of a complete telephone, even the ringer being installed, which probably accounted for the offender knowing just who was using the line on each occasion.

After tearing out and destroying the connections upon the wall they returned to the house, where the others were anxiously awaiting their return, eager to hear what they had learned. They told their story and showed their equipment.

"A pretty clever piece of work, to say the least," remarked the manager.

"Too smooth for 'im, was you, Mr. Carliss? Well, now, I swan," ejaculated Mr. Bromsby.

"What a peart man you be, Mr. Carliss," seconded the housewife, admiringly. "Well, your dinner's ready for ye."

"No glory in being a caddie in one's own country," muttered the troubleman. "Now, here is where I show what I can do," he added, as he seated himself at the table.

The three telephone men were soon on their way cityward.

"It beats the world the amount of misdirected energy there is running loose in the woods around here," mused the engineer.

"Yes, and good cigars will land the game every time. Stogies? Bah!" philosophized Biggsby as he blew a cloud of smoke into the air reflectively.

TELEPHONES ON ELECTRIC RAILWAYS.

There are three methods followed in the application of the telephone to electric railway dispatching: (1) Fixed telephone substations in booths placed at suitable points along the line. (2) Jack boxes at poles to which portable telephones carried in the cars may be hung and connected for temporary use. (3) Portable telephone sets hung upon the front of the car, the vestibule platform of which serves as a booth, and attachment made by flexible wires to jacks at numerous poles along the line.

On some railway lines, says Technical Literature, the method of connecting a telephone on the car with the line is not by means of a jack at the side of one of the poles, but by a long slender rod carrying the wires, which may be hooked upon the main lines at any place.

The telephones used on electric railroad systems must give transmission which is clear and loud, and must be of types not liable to be placed out of service by the jar of continuous transportation on a car.

Application of the telephone to train dispatching on electric railways has resulted in a marked economy of both plant and operation, in that the ability of the superintendent to be informed as to the position of the various cars and to communicate with their operators gives a greater service efficiency to the road.

The telephone is of great service in severe snowstorms by reason of the facility which it affords for information to be given the train dispatcher as to the condition of the road. In cases of mishap the telephone affords means for

the quick clearance of the track by the facilities of obtaining wrecking cars or repair hands. In cases of accident not only can medical help be summoned for the injured but means can be taken to procure information relative to details of the occurrence which may be of great importance in ascertaining the liability of the company.

DEVELOPMENT IN ALBERTA.

Regarding the telephone development in the province of Alberta, Canada, W. H. Cushing, of Calgary, minister of public works, says:

"We started out last year to build up a provincial system of telephones. In the very first place, we are constructing all over the province a trunk system, connecting with our villages, towns and cities. Wherever a municipality desires to own or control its own local exchange, we do not propose to interfere with such at all, but we will provide it with an excellent long-distance service. But whenever a municipality does not desire to establish the local exchange the government provides and operates it; and it is intended to supply all rural districts, wherever this is at all practicable, with a thoroughly efficient telephone system. This, in a few words, is our program.

"There was no previous agitation on the subject, nor was the government asked to do anything in the matter. But at the very first meeting of our first legislature we passed some legislation on the subject, and voted money to begin operations. We attained our first practical results last fall when we opened for service a line between Calgary and Banff, a distance of about 90 miles. This was all we did last year, but we are at the present time engaged in building a line from Edmonton to Lloydminster, a distance of about 200 miles. We are putting in exchanges in all the towns along these lines, as we proceed. We have now a line built from Weetaskawin to Day's Land, and we are constructing lines from Lacombe to Steetler, and from the Crow's Nest Pass coal fields to McLeod. This, together with the exchanges which we are providing in the towns situated upon these routes, is all that we are doing this year, and when all this work is finished our system in operation will comprise about 500 miles. Of course, we will continue with the work of construction until all the towns in the province are connected by long-distance lines. Eventually we will have a lot of town exchanges; indeed, we will have the majority of them, because few small towns wish to own their own exchanges. We have voted in our two sessions of the legislature $225,000 towards this work. We began with $25,000. Our manager is S. Edwards, who was formerly one of the superintendents in charge of their telegraph system in the west. Latter on we will probably require the services of a telephone expert, when we get the entire system in operation. Besides the 90 miles mentioned, we are operating exchanges which we acquired from private companies, as we purchased the exchanges in the Crow's Nest coal field towns and at Fort Saskatchewan. We have not yet reached an estimate in respect to the entire probable cost of our provincial system. In the small towns we are charging from $20 to $24 for business telephones and from $15 to $18 for residential telephones. In the larger towns we are not yet established. Edmonton owns its own system, and Calgary has the Bell, which charges $35 for business and $24 for house telephones. Their service was not satisfactory last year, but during the present year it has been improved. I cannot give their long-distance rates, but our rate from Calgary to Banff—90 miles—is 40 cents for three minutes' use of the line. We pay the Bell company for the Calgary connection a commission of 20 per cent, and a terminal charge of 5 cents for call; and our long-distance service will be established on a somewhat similar basis, having regard to mileage, throughout the province.

"The farmers almost everywhere in the province are asking for telephones, but we have not as yet fixed the rates for this class of service. I may, however, say it is our intention to make the rates as low as possible, and just sufficient to cover the cost of operation, including, of course, repairs, and no more. We have not fixed as yet the figure for depreciation, but it will not be less than 5 per cent. Much will depend upon the length of time the poles will last. We are using 30-foot cedar and tamarack poles. The former come from British Columbia and the latter are obtained locally.

"We will have about 500 miles of trunk telephone lines in operation next year, and one thing is, at all events, positively certain—that our farmers and everybody else will get telephones at a reasonable figure. We are not going in for a money-making scheme; our object is simply to supply our people with telephones at the lowest possible price."

The province of Alberta now has a population of 285,000. In 1901 the population was about 70,000, so the growth is truly remarkable.

THE TELEPHONE BUSINESS.

President Gary of the International Independent Telephone Association, speaking of a "Better Understanding of the Telephone Business":

"The telephone business is a truly stable business. The one need of the day is a better understanding of certain fixed things in connection with it, which must be done before sufficient capital can be induced to flow to it. The increasing business necessitates a corresponding increase of the investment, and this, too, in an increased amount to each unit as the plant grows in numbers. This is not generally understood and has had a tendency to disconcert investors, but if the men in charge of the business understand the increase in the investment per unit with growth, and will educate the investor from the start, he will know what to look for, and not be alarmed when he makes the discovery.

"The business is a fixture. The companies are held to be public service corporations, and are compelled to provide service to the public, and all courts recognize these principles, and allow the companies sufficient rates to make the business remunerative; hence, the management must increase the revenue per station with the increase of numbers. This can be done in two ways—one, by restricting the service; the other, by increase in rates. These points must be known to the investor before he will continue to take the securities of a telephone company that he knows was bonded, say, for $100 per station, at one time, and perhaps has steadily increased the investment per station to $400. Without the knowledge that the plant increases in cost, per station, with increase in numbers, he must conclude that the company's stock and bonds are being inflated.

"The remedy is a franker statement. The management and boards of directors of telephone companies need to be impressed with these facts, then through them the investors. There has been very little trouble to finance any good telephone prospect, and all the funds required to install the new plants quite easily found, while in later years with the increased cost of plant per unit funds for extension have been uniformly hard to reach, while, if the facts were known in the first place, the investors would stand solid as long as dividends and interest were in sight; and if the management understood the business and their rights, there can be no doubt of sufficient revenue to make the business remunerative. Let it be understood that a good plant increases in cost per unit with the increase in numbers in an exchange."

The telephone exchange in Antwerp, Germany, was completely destroyed by fire recently.

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

WHAT IS REASONABLE REGULATION OF USE OF STREETS BY TELEPHONE COMPANIES?

IN 1906, the Wisconsin Metropolis Telephone Company presented a petition to the city of Milwaukee, asking among other things that the city refer the petition to the board of public works to the end that the board designate the rules and regulations and requirements under which the company should act in laying and constructing certain telephone lines then in contemplation. After a delay on the part of the city of a month in taking action on the petition a second request was made to the city urging that action be taken on the prayer of the petition originally filed. After failure to secure any action the company began mandamus proceedings to compel the desired action. It was agreed between the parties that the company had the legal right to occupy the streets of the city for the proposed purposes but the city urged that no demand had been made on the common council and that the prayer that the petition be referred to the board of public works was not such a demand on the council as it was legally bound to respect and hence the council had not failed in any duty to the company. On this ground the mandamus proceedings were dismissed. In the opinion, the course that the company should have taken is suggested, namely, to have demanded that the council furnish the company the rules and regulations which the city would demand of the company in its proposed action. The intent was clear but technically the proper demand had not been made. In the course of the decision the court outlined the scope of the meaning of "regulation" in the sense in question, which we quote as follows: "This power of regulation includes the prescribing of those streets upon which it is deemed consistent with the public good that the wires be placed and those from which they should be excluded; also the method of construction so far as public welfare is legitimately concerned. The company having a franchise, subject only to such police regulation, has a right, and the municipality owes a duty, upon proper application, to prescribe such restrictions and regulations as it deems necessary. In prescribing the same, of course, there is a broad field of legislative discretion which may be exercised, but the discretion is limited to that which is reasonably necessary and is consistent with the purpose of the general law giving to the company its right and franchise to conduct its business in and over the highways of the city. The city may not under the guise of regulation practically exclude the company." And with reference to the prayer of the company that the city approve a certain plan of streets, it was stated: "Of course, no duty rests on the city to approve a plan of streets or to prescribe regulations for such corporation until proper application has been made therefor . . . They (the council) may be commanded to act, but not how to act." The basis of the decision is the familiar proposition that the legislative body of a municipality, generally the common council, has the inherent authority to provide reasonable conditions, rules or requirements under which a telephone company may operate upon its streets to the end that the general welfare of the community may be thereby guarded. As soon as the restrictions go beyond this degree they are unauthorized and unlawful.

State ex rel Wisconsin Metropolis Telephone Company v. City of Milwaukee et al, 113 N. W. 40.

INSPECTION OF POLES AND LINES IN PENNSYLVANIA.

The following were the facts in a personal damage suit in the above state: "A telephone pole was charred at a point where an electric light wire either did or could have come in contact with it. The pole leaned toward the electric light wire and away from its proper position. The electric wire sagged in the direction of the telephone pole. Some one, not disclosed by the testimony, at least six weeks before the accident, realized the danger and attempted to remedy the difficulty by nailing a piece of board on the pole, and attached thereto a bracket a few inches wide, on the end of which was a glass insulator to which was fastened the electric wire. The decedent, an employe of the telephone company, was not familiar with the lines in the vicinity of the accident. In an emergency, caused by a storm, he was sent out from Wilmington to aid the local employes at Chester in locating the trouble and making repairs to the lines.

"While descending the pole something happened—no one knew what—however, it was apparent that he had received an electric shock which was sufficient to cause his death. Immediately after the accident it was noticed that the electric wire for a few inches on either side of the glass insulator was uninsulated. How long it had been in this condition, there is no positive evidence to show." On these facts the supreme court has held that the case should be submitted to the jury, the court saying with reference to the law of inspection, as follows: "It was no part of the duty of the telephone company to repair the lines and wires of the electric light company, nor in this particular instance, to properly insulate that portion of the wire uninsulated. It was, however, the duty of the telephone company to inspect its poles and lines, and maintain them in a safe condition as to the public and as to its own employes. It was the duty of the telephone company to keep its poles and lines free from contact with dangerous and deadly currents of electricity not properly protected and this duty rested upon it no matter whether the dangerous currents were produced by the telephone company or by some other company generating electricity. If the defective condition of the electric wire existed for a period of six weeks, and the facts were sufficient to justify the jury in so finding, the telephone company was affected with constructive notice at least, and the duty rested upon it to give notice of that dangerous condition to its employes."

Combs v. Delaware & Atlantic Telegraph & Telephone Company, 67 Atlantic 751.

AUTHORITY TO USE STREETS—FEDERAL VIEW OF MINNESOTA STATUTE.

The case of the Northwestern Telephone Exchange Company to compel the city of St. Charles of the above state to allow the erection of a telephone exchange in that city, in which the right of the company was denied by the city until such time as the company should obtain a franchise in the regular order, has finally been decided by the United States circuit court for the district of Minnesota, First Division. The decision contains so full a statement of the law that we quote the major portion of it, as follows:

"It appears that the complainant company was established under chapter 34 of the general statutes of the state of Minnesota in the month of December, 1878, and that on March 7 in the year 1881 an act was passed by the legislature of the state amending section 42, title 1, chapter 34, so as to make the same read as follows: 'Any telegraph or telephone corporation under this title has power and right to use the public roads and highways in this state, on the line of their route for the purpose of erecting posts or poles on or over the same to sustain their fixtures; provided, that the

same shall be so located as in no way to interfere with the safety or convenience of ordinary travel on or over the said roads or highway.' Then on April 19, 1893, an act was passed, amending the same title, providing that: 'No corporation formed under this title shall have the right to construct, maintain or operate upon or within any street, alley or other highway of any city or village, any improvement of whatsoever nature or kind, without first obtaining a franchise therefor from such village or city, according to the terms of its charter, and without first making just compensation therefor, as herein provided.' And on the 13th day of April, 1901, there was an act passed by the legislature of the state, which provided that : 'Nothing herein shall be construed to grant to any person, persons, association, or corporation, any rights for the maintenance of a telephone system within the corporate limits of any city or village in this state, until such person, persons, associations or corporation shall have obtained the right to maintain such system in such village or city, nor for the period beyond that for which the right to operate such system is granted by such city or village.'

"Now it is unquestioned that the legislature of the state has the power as a governmental function to control the highways of the state which includes streets in cities and villages, as well as alleys and that has always been the law. Under this amendment of March 7, 1881, there was granted to telegraph and telephone companies the right and privilege of placing their poles bearing wires upon public highways of the state, provided that it should be exercised in such a way or manner as should not in any way interfere with the ordinary travel of highways. This, in my opinion, constituted a license to telegraph or telephone companies to make such use of the highways of the state as was provided in that act; and in all cases where that was done while that act was in force in the language expressed in the act of March 7, 1881, and moneys expended by the corporation placing the poles and wires upon the highways, it would be equivalent to a contract on the part of the state that such corporation should have the right to continue to use the poles and wires so constructed and erected, and, of course, to make the necessary repairs from time to time to keep the line in efficient condition. But I cannot assent to the idea that the offer of this privilege or license took away from the state in any manner the continuing power of absolute control over the use of the highways or streets in the state. As I said, such control is a governmental function, and not a proprietary one. The state, absolute as its power is over the use of the streets and highways, is not ordinarily the proprietor of those streets and alleys. It does not own the fee, which usually belongs to the abutting owner. But the right of the public to use the streets for the ordinary purpose for which highways are used is superior to any right of the owner to the fee of the land; and the fact that the state does not own the fee, in no way diminishes its power and control over the use of the streets. It had the right, so far as companies had not taken advantage of the license that was offered, at any time to change the terms upon which it would assent to the use of the streets for telegraph or telephone purposes, or to abolish those privileges altogether. There would be nothing in the shape of a contract between any such company and the state, except so far as the company had used that license and expended money upon it; and with respect to all other streets and highways in the state such company would have no continuing license or control after a change in the law relating to the subject. Therefore, I think it was within the power of the legislature, after the passage of the act of March 7, 1881, even although the complainant had before that time formed the idea of covering the state and its cities and villages with telephone lines and exchanges, so far as that had not been done in the actual use of license or privilege theretofore granted, to make a change, and thereupon the license, so far as not used, would cease; or the legislature might attach other conditions to the license, and by the act of April 19, 1893, and the latter act of April 13, 1901, it did, as far as urban highways were concerned, or streets and alleys in the cities and villages, attach another condition, prohibiting the use of the streets and alleys in villages by telegraph or telephone companies, unless a franchise to that effect was granted by the city or village authorities."

It was shown that the company already had a long distance line through the city and the company claimed under this fact that it had authority to extend its St. Charles exchange so that more persons would have the advantage of this long distance service, but it was decided that under the authority to maintain a long distance service it could not go on and erect an entire new local exchange even if the subscribers thereto would have the long distance benefit. It was also urged that the long distance service being interstate commerce the state could not interfere therewith by limiting the development in the city of St. Charles of long distance subscribers which would in fact happen by the building of a local exchange. On this the court said:

"But I apprehend that this fact makes no difference in the present case. While any interference by the legislature with an established instrument of interstate commerce might be a subject for criticism, still the fact that a line of telegraph or telephone will, when completed and in use, be used for the purpose of interstate commerce, gives no right to the persons or corporations projecting the establishment of a concern of this kind to do so upon terms different from what others would be required to submit to in the establishment of a similar enterprise."

Northwestern Telephone Exchange Company v. City of St. Charles, 154 Federal 386.

MALICIOUS INJURY TO TELEPHONE LINES IN MISSOURI CONSTITUTES A FELONY.

In a criminal case in the above state the facts developed that the two defendants were in the employ of a certain company and were engaged in repairing the company's lines. In this work they cut away certain private lines of telephone operated by individuals which in the opinion of the employes were strung dangerously near the company's lines. They were arrested and convicted under the provisions of section 1261 of the laws of 1899 and were fined therefor. An appeal was taken in which it was urged that the statute under which the defendants were convicted was repealed by the provisions of a statute passed in 1901 in which it is declared that the malicious injury to telegraph lines shall constitute a felony; that telegraph includes telephone and as the defendants had not been indicted as is necessary in proceedings for a felony that they were not legally convicted. The court of appeals took this view and reversed the conviction.

State v. McKee et al, 104 S. W. 486.

OCCUPATION OF CITY STREETS IN NEW YORK.

In a recently decided case one Gannett brought injunction proceedings against the Independent Telephone Company to compel it to desist from erecting a certain pole or the stringing of wires in front of his premises in the city of Syracuse. The population of this city is over 100,000. It is unnecessary to state more of the facts in the case. The law was stated by Justice De Angelis of the supreme court, sitting in Onondaga county, as follows:

"The Eels case establishes the rule of property in this state to be that the maintenance of a telephone line in a country road between the center line and the exterior line of the highway upon property, where the owner holds the fee to the center of the road, is an additional burden, not contemplated by the original dedication of the highway, and not within the scope of the public use. The reasoning of the court in that case has been the subject of considerable criticism; but, in whatsoever light that rea-

soning may be regarded, that case establishes a rule of property in this state. But a distinction has been made between city streets and rural roads or highways in respect of the public easement. Whether the distinction is well founded in its last analysis does not require discussion here. In the present condition of the adjudicated cases, I think I am required to hold that the maintenance of a telephone line in front of the plaintiff's premises . . . is within the public easement and a proper street use. (Citing, Castle v. Bell Telephone Company, 63 N. Y. Supp., 482) . . . It seems to me with this proposition settled, the plaintiff can have no private injury . . . for it must be conceded that there was no attempt in this case to invade private property of plaintiff or interfere with private rights. There is no doubt but that telephone companies get their right to the use of the public easement in streets directly from the legislature, but subject to police regulation by the municipalities." It will be noted that the case above referred to is not a decision from the highest court of New York, the court of appeals, whereas the Eels case is from that court, accordingly the rule of law stated in the Castle case, while very favorable to telephone companies, may be subjected to change if in a proper proceeding the question involved should be there taken.

Gannett v. Independent Telephone Company of Syracuse et al, 106 N. Y. Supp. 3.

EJECTMENT TO COMPEL REMOVAL OF TELEPHONE WIRES.

Ejectment will lie to compel company to remove telephone wire crossing private premises even though not attached thereto in any manner. The New York Court of Appeals has decided a case in which this proposition was laid down as the law. It was proved that the wire in question in the suit did not at any place touch any structure on plaintiff's land or premises but the court, nevertheless, held that the company must remove it on the theory of the law that the ownership of land extends upwards an indefinite distance, or downward in like degree, and that the stringing of a wire over the surface of the land is in law an obstruction to its use which the courts will recognize and order removed.

Butler v. Frontier Telephone Company, 79 N. W. 716.

DON'TS FOR CANVASSERS.

The Wisconsin Telephone Company, through the Wisconsin Telephone News, gives its solicitors the following admonitions:

Don't chew tobacco or gum while dealing with a prospective subscriber.

Don't be careless about your personal appearance. Clean hands, nails and clean linen count for much in successful salesmanship.

Don't loiter while out looking for business. Keep a list of prospects ahead so you will always have something to work upon.

Don't fail to be agreeable. Let your actions and speech be always courteous, affable and above reproach.

Don't hesitate to ask your superior for information on any point not fully understood.

Don't lose any opportunity to become familiar with other branches of the service. The more you know, the more business you will secure and the more valuable you will be to the company.

Don't neglect to faithfully keep an appointment made to call upon a prospective patron.

Don't fail to leave a prospective customer in such a way as to enable you to call again.

Don't be too easily turned away by a prospective subscriber. If you are satisfied he should have our service in his business, a little persistency politely used is likely to sooner or later bring you success.

Don't make any promises or representations not authorized in the contract. The company had much better not secure the customer than to have him believe that his patronage was obtained through deception or misrepresentation.

Don't lose interest in a subscriber as soon as his contract is secured. Follow him up and when his station is installed ascertain how it is working and see that his service is satisfactory, or if not report the facts to your superior.

Don't fail to get the name of the new subscriber correctly, the proper address with street and number for the directory entry. Accuracy in these essentials prevents errors and delays in other departments.

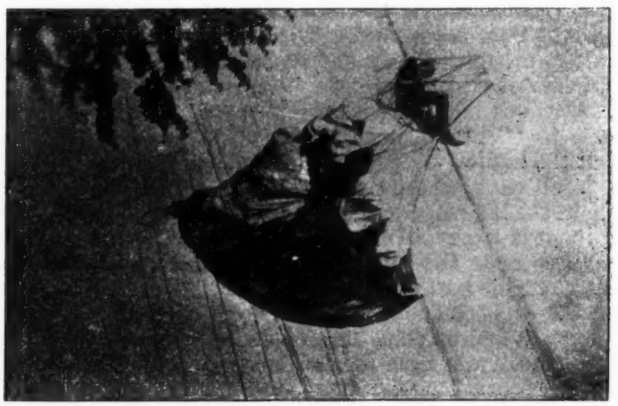
Don't forget that the customer looks upon you as being the company and that the impression obtained from your words and actions will be his estimate and impression of the company, probably for all time.

Don't make the same mistake twice.

WIRE SAVED AERONAUT'S LIFE.

Because his balloon landed and became entangled in telephone wires at Grand Ledge, Michigan, recently, an aeronaut escaped death.

During the progress of a barbecue, W. T. Sprague, a Lansing aeronaut, made a balloon ascension and parachute drop. Unfortunately for both the balloonist and the telephone company, he landed in a heavy lead of telephone wires with terrific force, "shorting" every pair in the lead. He hung for some time suspended by the wires in a tangle of ropes and canvas, but was finally released from his predicament uninjured.



The accompanying illustration, for which TELEPHONY is indebted to the Michigan State Gazette, gives an interesting view of the airship pilot's hair-raising experiment.

LONG-SUFFERING "CENTRAL."

Telephone girls have lots of fun, especially those who are stationed in the resident sections. The average housewife, paying two dollars or so per month for the telephone, expects the girl at the other end of the line to be a walking compendium of useful information. She will call up central to ask the time of day, to find out what show is in town this week, learn who won the ball game, to find out if there will be services in the Methodist church next Sunday and to learn whether green or blue is the most becoming to strawberry blondes.

"Hello, Central," said one woman one day. "Are you near the window?"

"Quite near," replied Central.

"Well, I wish you would kinda keep your eye out for a milkman and if you see one tell him to stop around to 35 Roxbury street, will you? The cat just knocked over my bottle and broke it and I expect company and I'm in an awful pickle."

Central's reply is not recorded.

THE TELEPHONE AS A DETECTIVE

As a Feature of the Police Protection System It has Become Indispensable in All American Cities

By R. B. Foss

"WHO is your star detective?" asked a visitor at the New York police headquarters, expecting, of course, the official interrogated would name some sleuth whose ability in preventing and punishing crimes probably would rival that of Sherlock Holmes of fiction.

"There you are," was the superintendent's answer. "That's the greatest detective in the business." He was pointing to a telephone instrument on a desk near by.

The constant use of the telephone by the police in this country well attests how important a part it plays in the protection of the public. Scotland Yard makes but little use of the telephone, but throughout the United States it is utilized many times a day and, in fact, is considered indispensable. The instantaneous communication it furnishes between the cities of the country makes the telephone an invaluable feature of the police protection system.

It is a common practice among the police of the big cities to telephone all the way from ten to a thousand miles when on the trail of a suspect. Indeed, the police in this country were among the first to make use of the telephone after its invention in the middle seventies, whereas it appears that the adoption of the telephone as an agent of the London police is a comparatively recent move. The first telephone companies made a specialty of police telephones. To-day in all large American cities the police stations are within easy reach of everyone through the telephones in residences, business houses and the public booths which a telephone engineer, Thomas B. Doolittle, introduced in New York a little less than thirty years ago.

A glance through the police records of any city shows how important a means of public security the telephone has become. There is a surprisingly large number of instances in which night operators on call at central offices have brought the police down upon desperadoes and thus prevented many a haul. In some cases burglars have cut the telephone wires before entering a building, so much do they fear detection through the agency of the telephone.

A day seldom passes that criminals are not arrested in every city by the aid of the telephone. The following incident, which occurred in New York, is a sample: A servant in one of the big houses in the fashionable quarter of the metropolis, hearing suspicious sounds in the house in the dead of night, tiptoed downstairs and woke up her mistress, the only other person in the house. This woman had wit and grit enough to suppress her natural impulse to scream and wake up the neighborhood; instead, she reached over in the dark and took her bedside telephone up from the table and asked 'Central' for police headquarters, and when the connection was made she quietly told the man at the other end of the line who she was and what she wanted. As luck would have it, the policeman on the beat 'rang in' a minute later, and before the rascal in the dining room had got all the silverware into his kit he found himself looking into the business end of a six-shooter. A neater capture would be hard to find in police records, yet before the telephone came into general use this would have been impossible.

New uses of the telephone in connection with the work of maintaining law and order come into notice almost every day. One of the latest stories comes from Ohio. The mayor in one of the cities in the buckeye state, while presiding at an inquiry, called for testimony of one of the members of the police force. It was found that the man was then patrolling his beat.

"Call him up on the telephone," said the up-to-date official. When the man responded the mayor took his testimony in the form of an affidavit.

"Do you swear that this is true?" said his honor, reading the statement to the witness.

The policeman took oath that he had spoken the truth, the whole truth and nothing but the truth.

"The affidavit is admitted as testimony," said the mayor, and the novel incident was over.

Sometimes these stories about the police and the telephone have a humorous side. For instance, in Brooklyn an ex-militia man detected a burglar outside his window. Reaching for his revolver, he let go. The intruder skipped across the back yard and mounted the fence just in time to invite a fusillade from a whole nightgown squad. There was one man in the neighborhood who, not having any firearms, made good use of the telephone. He called up police headquarters and in a few minutes the fugitive and two pals were wearing handcuffs. It turned out that the telephone was decidedly more effective than the revolvers, for not one of the shots fired from the windows in the vicinity had counted.

As a matter of fact law and justice, in some form, have been dependent upon the telephone, it seems, ever since the talking lines were made to connect city with city. It was a New York lawyer who, years ago, started long distance calls. That happened just as the telephone experts were putting the finishing touches to the New York-Boston line, the first one to bring two big cities in touch with each other. The lawyer who was the hero of this feat found at the eleventh hour that he was due in Boston to argue in an important case. Not wishing to cause a delay, he was at his wits' end how to instruct his colleague in Boston. The telegraph would not do. Perhaps the new telephone line to the Puritan capital would. It did, and successfully, too. That is the first case on record of long distance telephony serving in a professional case. Nowadays such cases are as commonplace as journeys between New York and Boston.

So the telephone, by serving not only lawyers and the police but judges and juries, has become a public safeguard. There are many cases on record where witnesses have telephoned their testimony to the courts. In some parts of the country minor cases are frequently disposed of by telephone. This is particularly true of cases in which the defendant is ready to plead guilty and the judge knows that the fine imposed will unquestionably be paid. Thus the telephone has come to be a very common intermediary between the courts and the accused in trials relating to overspeeding on the part of automobilists. All concerned save time and money by settling the matter by telephone.

Ordinary uses of the telephone are growing too common to mention now and it is only the novel uses that attract attention. The telephone is now in its thirty-second year of practical use, and yet nearly every day, by being of service in some odd emergency, it is furnishing stories never before related.

DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

868,880. Sound Transmitter and Receiver; Mundy. This device consists of a focusing shell submerged in water and adapted to receive sound vibrations and to focus them upon the diaphragms of a transmitter which is contained within the hollow shell. Patent assigned to Submarine Signal Company.

868,933. Telephone Exchange system; Lundquist. Each switching mechanism in this system has associated with it a non-interference magnet operating by the reduction of resistance in its circuit. Interfering connections are broken when magnet is operated. Patent unassigned.

869,060. Fuse; Cook. The terminal cap of this fuse has a portion flattened in a plane parallel with the axis of the fuse and off of center of the latter. The fusable conductor within the small bore of the surrounding tube can thus be extended without interference from the cap. Patent unassigned.

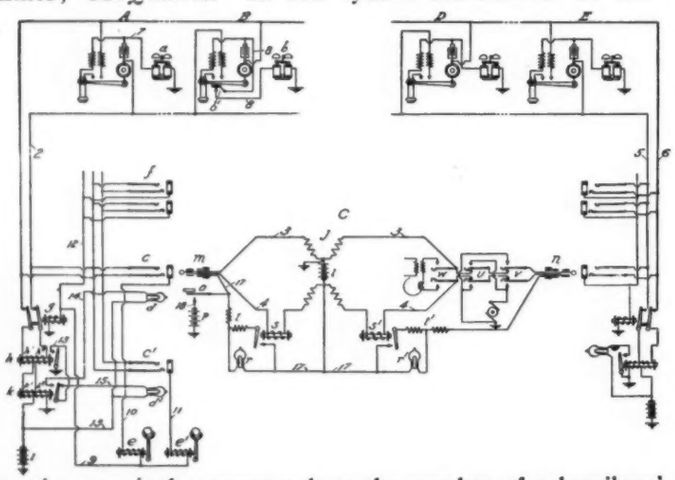
869,067. Telephone System; Dean. A relay in the cord circuit controls the automatic ringing means. The called subscriber in responding disconnects the ringing means at the central station, through the control of a device provided for that purpose. Patent assigned to Kellogg Switchboard & Supply Company.

869,119. Telephone System; Webster. Each limb of the telephone line in this system is provided with an electro magnet arranged to actuate a line signal. When a connection is established with the line one of the magnets is shunted and the signal is retired. Patent assigned to Kellogg Switchboard & Supply Company.

869,288. Sound Amplifier; Baldwin. This device comprises a conduit provided with two valves for varying the flow of liquid through the conduit. Sound wave vibrations cause an increase or decrease in the flow, through the medium of the apparatus mentioned. Patent unassigned.

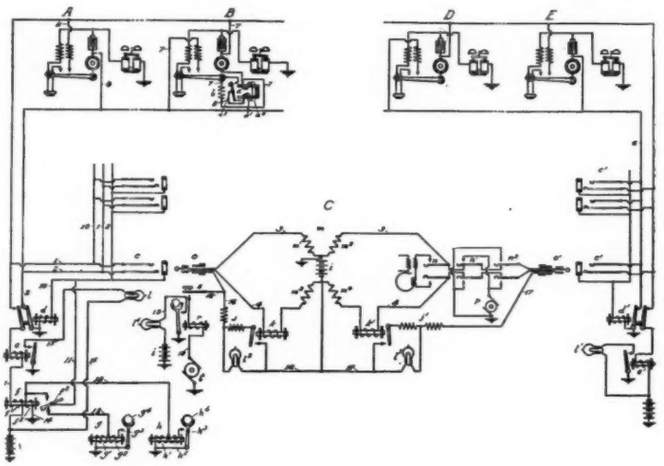
869,368. Adjustable Support for Telephone Receivers; Higgins. This device comprises a rod capable of universal movement upon which the receiver is held. The support can be moved so as to break or close the line circuit and by its use the necessity for holding the receiver in the hand is obviated. Patent unassigned.

869,449. Measured-Service System for Telephone Lines; McQuarrie. In this system the number of con-



nection terminals corresponds to the number of subscribers' stations and for each terminal a selectively controlled signal is provided, together with the connection register associated therewith. Patent assigned to Western Electric Company.

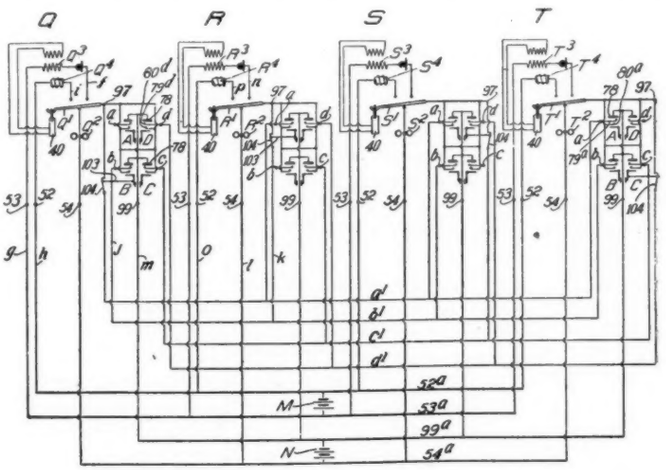
869,450. Measured-Service System for Telephone Lines; McQuarrie. A current controlling device is included in the bridge of the line and is actuated by the telephone switch hook. By means of this current controlling device the selection and operative connection with the



line of the connection register corresponding with a particular substation is effected. Patent assigned to the Western Electric Company.

869,973. Telephone-Supporting Apparatus; Lehmkuhl. This device comprises two members pivotally connected together, one of said members having a ratchet wheel with means to create resistance to the movement of the ratchet wheel. Patent unassigned.

870,168. Intercommunicating Telephone; Henry. The apparatus used in this system consists in part of a tele-

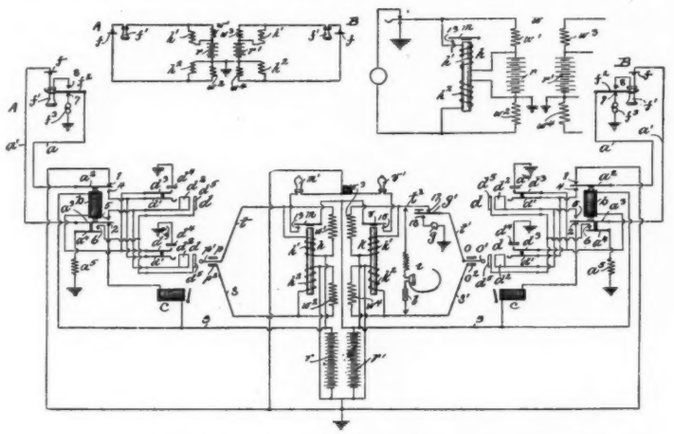


phone box containing the usual telephone mechanisms mounted as a unit therein and below these a switch mechanism which is operated by a series of levers whose protruding ends are provided with push-buttons. Patent assigned to Samuel H. Couch.

870,530. Individual Protector Unit; Cook. This device comprises a sheet metal base having insulating por-

tions on one side thereof bearing spring members arranged for the support of suitable fuses. Patent unassigned.

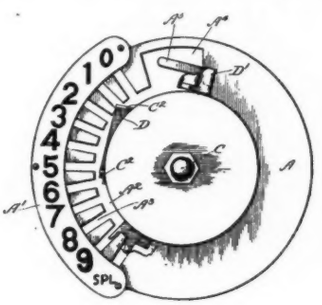
870,551. Central Energy Telephone System. Dunbar. In this system the supervisory relays have double windings. The windings are placed in opposition so that during the passage of the charging currents through both windings the relay remains inert but may be actuated by sending

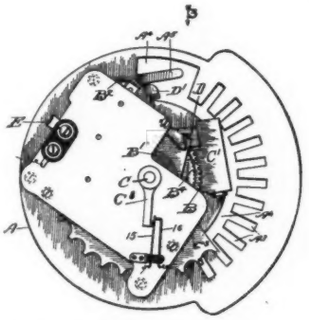


current through one of the windings alone. Patent assigned to Kellogg Switchboard & Supply Company.

870,574. Fire Alarm System; McDaniel. In this system an ordinary rheotome bell is included in a circuit concuit controlled by thermostat devices which, upon being heated to a pre-determined degree, cause closure of the circuit and actuation of the alarm bell. Patent unassigned.

870,634. Calling Device for Telephone Exchanges; Lundquist. This is an impulse sending device designed to be operated by the calling subscriber. It consists of a disk



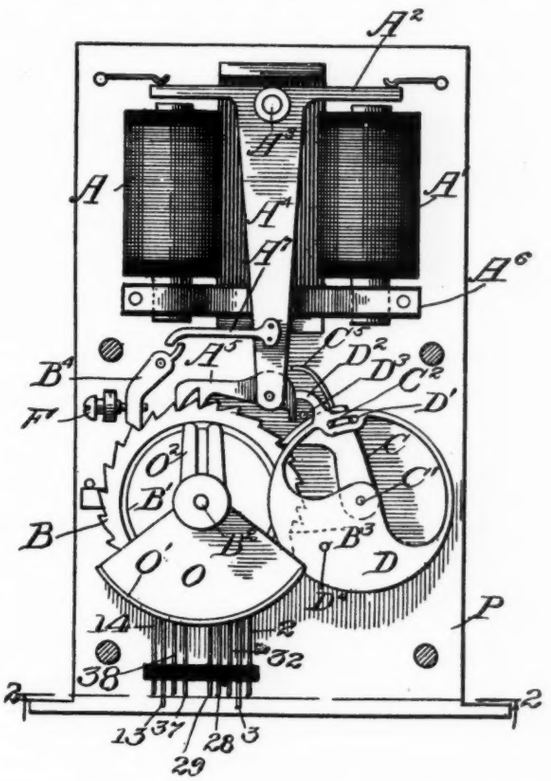


having numbers and a lever arranged to be operated manually and to pass within the casing when so operated. Patent unassigned.

870,714. Electrothermo Protector; Cook. This protector has an openable joint in the circuit normally held against opening by a non-conducting cement. On a rise of current the cement softens and the joint is opened but the circuit through the conductor is kept closed through the action of a spring contact coil. Patent unassigned.

871,042. Telephone Exchange; Norstrom. This invention is designed to obviate the trouble caused by the residual magnetism in the magnets of automatic switches. Each operating impulse is automatically followed by an impulse in the reverse direction of such short duration that it is without effect on the magnets other than to relieve them of their residual magnetism. Patent assigned to Casper L. Redfield.

871,043. Telephone Exchange; Norstrom. This is a step by step selective mechanism for party-line systems. The switching mechanisms at the various stations are oper-



ated by impulses from the central office, automatically stop at the end of a pre-determined number of steps and those at the selected stations can be further moved beyond their normal stopping points by means provided for the purpose at the central office. Patent assigned to Casper L. Redfield.

871,092. Selecting Device for Telephone Exchanges; Lundquist. This device consists of a dial arranged on the exterior of the telephone box upon which is also mounted a pointer which can be set at any number on the dial. In returning to its original position contacts are closed and impulses are sent over one line, a final impulse being sent over the other line. Patent unassigned.

FAKE TELEPHONE POPULARITY.

The lady of the house, the second day after the coming of the new maid, whose last place was with a society leader, was to have callers. Just before the company came the maid said to her mistress, in a confidential tone:

"Shall I go out and telephone to you while they are with you?"

"Telephone!" exclaimed the mistress. "Why, what do you mean? What in the world would you telephone to me about?"

"Oh, about anything at all," exclaimed the maid. "Don't you ever have it done? Why, at my last place and the one before that, too, I always telephoned the missus. She instructed me to—it was to give the impression to her callers that she was very popular and overrun with engagements."

But the maid's new mistress remembering many telephone calls that interrupted the conversation when she herself had been calling, and now regarding them with suspicion, declined to make a personal exhibition of popularity on those terms.

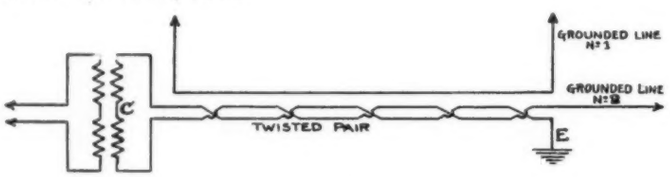
QUESTIONS AND ANSWERS

By H. P. Clausen

IN YOUR NEXT issue kindly give an explanation as to why some kinds of alternating currents will pass through a condenser and why another kind of alternating current will not pass through the same condenser. We have a cord circuit with condensers and double wound clearing out drops to keep the parties from ringing through. Kindly let me have information upon this subject. J. F. D., Indiana.

It is assumed that this arrangement has been applied for preventing the ringing of a telephone bell connected, say, to a calling cord circuit, while a telephone user is driving the magneto generator connected to the answering cord. We believe you are under the impression that there is a difference in the kind of an alternating current which will pass through a condenser, and it may be explained that, while you are driving the magneto generator connected to an answering cord circuit, most of the current available will pass through the winding of the clearing out drop, and should a very small portion of the current pass through the condensers, two of which are in series, the amount of current which passes through the condensers is not sufficient to operate the bells connected to the calling cord. Of course, if the generator is driven at a sufficiently high rate of speed or generates sufficiently great difference of potential, then it would merely depend upon the sensitiveness of the ringer connected to the cord circuit in order to determine when the bell would actually respond. The telephone currents, however, are of a much higher frequency, and instead of the largest amount of telephone current being lost through the winding of the clearing out drop, the greatest quantity passes through the condensers and is of course effective in vibrating the diaphragm of the receiver connected to the calling cord circuit.

I would like to ask a question concerning cross talk between a grounded circuit line and a partially metallic toll line. While I presume that line No. 1 would not be troubled by cross talk from line No. 2, yet would not line No. 2 be affected by inductions from line No. 1? E. R. H., Idaho.



As shown by the diagram, No. 1 represents a grounded circuit telephone line. No. 2 is also a grounded circuit line, but it is made metallic from *E* to *C*, a repeating coil being inserted at the point *C*, which presumably is at the central office. When telephone currents are passing over the line No. 1, you may be certain that induction disturbances are heard upon line No. 2. It is further fairly certain that you will have quite a little cross talk from line No. 2 on to line No. 1. It is suggested that if a repeating coil is placed at *E* instead of being placed at *C*, there will not be any cross talk from line No. 1 upon the No. 2 line, nor would there be any cross talk from No. 2 on the line No. 1. If the point *E* is not inside of a building, you might find it difficult to install the repeating coil in a satisfactory manner. At any rate, lightning arresters should be connected to the repeating coil in such a manner as to prevent the coil from burning out through being unprotected against lightning discharges.

Will you kindly furnish us with a list of manufacturers of telephone duplexers, and will you also advise us as to the advisability of placing the apparatus on full metallic rural lines where such lines are occasionally grounded through lightning arresters and through lack of tree trimming? Do the lines, which are equipped with duplex coils, require expert attention? What are the disadvantages? H. G. N., Pennsylvania.

We refer you to the names of the telephone manufacturing companies advertising in TELEPHONY. Most of them supply duplex apparatus.

Regarding the advisability of installing duplex coils in connection with full metallic rural lines, we presume you have reference to the duplexing of the lines for operating phantom telephone circuits. It is suggested that if your lines are of any considerable length, over ten or fifteen miles, it should be perfectly clear from any possible interference through tree grounds or lightning arrester grounds and leakages in order to permit rendering at all satisfactory service. It is difficult enough to operate a phantom circuit under the most favorable conditions, and you may rest assured that tree grounds and interferences of a similar nature will completely upset the noninterfering operation between phantom and metallic service telephone circuits.

This conclusion is obvious when you appreciate the fact that the slightest unbalancing of metallic circuits towards each other result in producing cross talk. Now, if we are operating phantom circuits on a pair of metallic lines, the unbalancing of the circuits not only interferes with the service between the metallic lines but also interferes with the phantom service. We would suggest that you purchase several sets of phantom coils and operate them between points, twenty or thirty miles apart, and obtain in this manner a thorough understanding of the behavior of phantom circuits under service conditions.

As I have become interested in the telephone business through experimenting and finally building lines and supplying stockmen and ranches with telephones and exchanges, I have now decided to branch out in the toll line business. I noticed an article in TELEPHONY in October on "Construction and Equipment of Toll Lines" where aluminum telephone wire has been used. As I am figuring upon building through an open country and far away from railroads, I was wondering if aluminum could be used with satisfactory results. The temperature runs from 30 degrees below to 80 degrees above. Can you recommend aluminum wire for this class of service? K. C., Oregon.

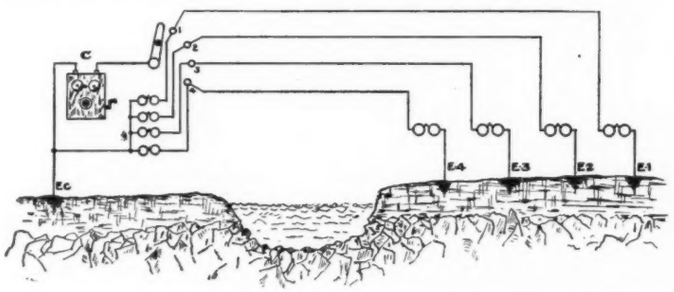
Aluminum wire has been used to a limited extent in connection with telephone circuits, and we have no direct information as to whether such wire will give the kind of service you require under the conditions you state. If any of our readers have had practical experience in the use of aluminum wire under circumstances similar to those recited by our correspondent, we shall be pleased to hear from them.

I wish to ask whether you can enlighten me how to increase the volume of sound over a telephone line supplied with a long distance transmitter and receiver, the transmitter being mounted upon a phonograph. I have used three dry batteries, but do not get good results. Can you give me any information upon this subject? C. F. M., Missouri.

In order to operate a transmitter successfully in connection with a phonograph, it is necessary that the instrument be carefully constructed and in such a manner so it will carry a large amount of current. The current of three dry cells will not as a rule be sufficient to secure the best results. Five or six cells of dry battery may be expected to give better results, but the commercial local battery transmitter will not always operate for any considerable length of time without being seriously damaged through the large amount of current. It is suggested that you write to TELEPHONY's advertisers of telephone apparatus, stating

your requirements. They will undoubtedly offer you instruments suitable for this special class of service.

We are up against a telephone proposition and have been carefully noticing your columns, thinking we might see something to give us some light, but have failed up to this time. Will you not advise us by mail? It is something like this: We have four telephone lines (all grounded circuit) and on each of these lines we have an instrument. Now, in the main office we have another telephone from which we run to a four point switch; we have the line side of each of the four telephones on the lines connected to a point on the switch. Now, when we throw the switch, say to point 1, we can ring over all the other lines and, of course, talk as well. The instruments are all 1,600 ohm ringers (bridging) and are all grounded on the same side of the instrument. If we throw the switch to point 2, say, we should only be able to call that point and no other. We have carefully gone over the lines and find them perfectly clear. Can you tell us where our trouble is? I give you an idea below how our system is connected. Try to assist us, for we have tried everything we knew and failed. J. P. M., Virginia.



Referring to illustration presented herewith, you will find that telephone *C* is provided with a four-point switch so that you can connect the telephone to any one of the lines, 1, 2, 3, and 4. The telephone *C* is connected to earth at *EC*, and the telephones 1, 2, 3 and 4 are connected to their respective earth connections *E*. You do not state in your inquiry the general character of the soil between your central office ground and the ground connections of the four telephones. However, if the instruments are all connected to earth, then it may be possible that you have present a condition which practically insulates the *C* ground terminal from the 1, 2, 3 and 4 ground terminals. This may be due to a layer of rock immediately below three or four feet of soil and possibly the ground connections may be separated by a stream of water. However, we believe that by merely indicating the possibility of an insulated ground connection, will give you the information required for locating the trouble.

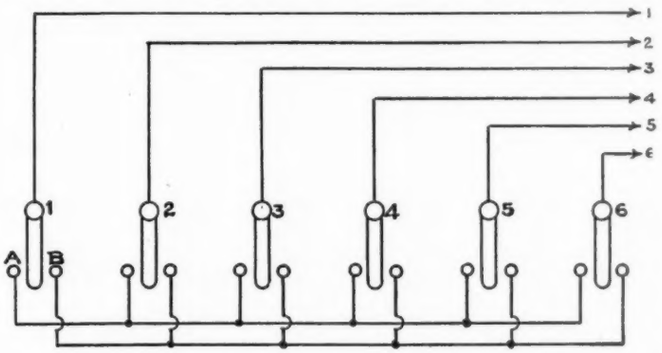
Obviously if the grounds of the four telephones are practically insulated from the central office ground, then it is easily explained that when you ring on line No. 2, the current must return over lines 1, 3 and 4, and owing to this division of the current, all of the bells will ring.

In connection with your answer to J. H., Iowa, will you kindly tell me why the condensers in the cord circuits will keep parties on the line from ringing through a connection? J. O., Washington.

If you will connect a condenser in circuit with a series type telephone, you will find that in order to obtain a satisfactory signal upon the bell it is necessary to have the condenser at least two microfarads or over. Now, if you reduce the capacity of the condenser much below two microfarads, you no longer obtain a satisfactory signal. If you reduce the capacity of the condenser so far you cannot signal the bell through it while turning the crank of your generator at an ordinary rate of speed, then it is obvious that you are not obtaining an interfering ring should the condenser be connected in circuit between two telephone lines. You will, however, find that even when the capacity of the condenser is as low as one-half of a microfarad that you are able to transmit telephone currents through it without any great reduction in the volume.

From the above you will observe that it is merely a matter of quantity of current passing through the cord circuit being limited which prevents the transmission of an interfering ring.

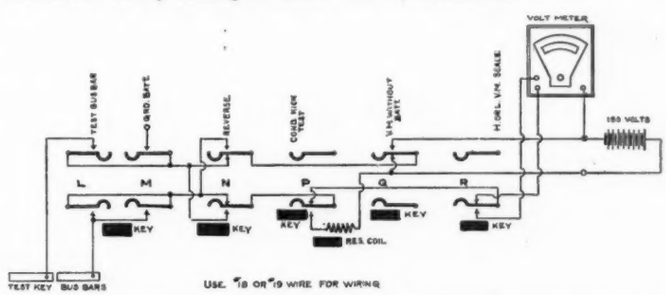
In your October number of TELEPHONY I see that R. S. L. asks for a simple switching arrangement for six lines. If I understand the arrangement you describe, you use twenty two point switches and five bus-bars. I am inclosing an arrangement which is being used for six lines, and it is arranged as shown by the diagram below.



I use No. 400 carbon lightning arresters in box with glass front which opens. By having the bell on the telephone wired direct to one of the lines, one needs only five extension bells. I use a heavy six inch two point switch from one bus-bar to the other for ringing and listening. This arrangement allows four lines to talk at once, two on each bus-bar. I find we can give quick, good service and I never have all the lines wanting to talk at once. By using three point switches instead of double throw single pole knife switches and three bus-bars, one can have all six lines talking at once. By making the switchboard a little large, one can add switches as needed. This is for grounded lines. I tried having the carbon arresters on the pole, but found it less trouble to have them at the switchboard. I use the arresters on the line terminal, but they do not need cleaning. I use No. 16 copper wire weatherproof insulation, No. 12 ground wire and No. 20 branch for bells with lamp cord running from distributing rack to switches. Kindly advise what you think of this arrangement. S. S. K., Kansas.

The diagram which you submit shows six single lever switches with two contact points for each switch. As shown, the arrangement permits connecting together two sets of two lines, while the third set cannot be installed until switches are provided with additional points. The arrangement proposed by the correspondent can, of course, be applied and possibly will cost less than that proposed in the above referred to query.

We have purchased a volt meter provided with two scales, one reading from 0 to 15 volts and the other from 0 to 150 volts. I would like to secure a circuit showing a good way to connect the volt meter to my testing circuits. W. T., Nebraska.



The illustration shown above will give you complete information as to the connections which you are required to make. In fact, the lettering upon the circuit will give you practically all the information necessary. Briefly, however, commencing at the left, the first key *L* connects the volt meter circuit to the testing bus-bar. The key *M* is so arranged that when operated one side of the volt meter is connected to earth and the remaining side to one of the bus-bars to the exclusion of the remaining side of the bus-bar. Key *N* is arranged for reversing the connection of the volt meter towards the circuits to be tested. The key *P* is

arranged for charging the line to be tested and permitting of the current discharging through the volt meter. This, of course, is useful while making condenser tests. Key *Q* when operated permits connecting the volt meter directly to the circuit to be tested without battery. Key *R* permits connecting either the high or low scale of the volt meter to the circuit to be tested.

How can I change the transmitter of a telephone now operating on 40 volt current so it will operate on a 20 volt system? Is it possible to do so? Kindly advise. I am using a Warner pole changer and at present have it connected from 75 to 100 dry batteries. Is it practicable for me to displace the dry batteries with current from storage batteries. The battery consistes of ten cells and therefore delivers a current of 20 volts. If I can use the storage battery service instead of the dry batteries, please advise what it will be necessary to do. J. H. W., Idaho.

As a rule the transmitters which are arranged for a 40-volt circuit are somewhat higher in resistance than the instruments which are built for a 20-volt service. It appears, however, that unless your transmitters are of exceedingly high resistance that you need not make any change when transferring the telephone from a 40-volt system to a 20-volt. It will depend a great deal upon the transmitter. If you find the resistance is too high, which you may determine by observing that the signaling apparatus does not operate very reliably when placing the 40-volt transmitter on the 20-volt system, it is suggested that you readjust the transmitter by shifting the carbon electrodes closer together than they are now placed. We strongly urge, however, that you do not attempt to adjust the transmitter without consulting the manufacturers of the instrument. Much harm is frequently done by attempting to adjust telephone transmitters without thoroughly understanding the special requirements of the instrument under consideration.

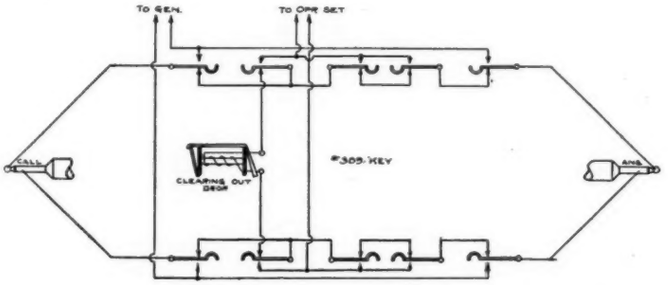
As respects the use of a 20-volt current upon the Warner pole changer, you will not be able to secure the necessarily high voltage required for ringing the bells connected to your telephone lines when you use a 20-volt current unless you have a special transformer made up to operate with the pole changer. It is thought the manufacturers of the Warner machine will be able to furnish you something along the lines of a pole changer. At any rate, it will be well for you to communicate with them and obtain prices upon a suitable transformer.

I will ask you for information regarding the use of ground wires in connection with ground circuit party lines. Will a No. 8 or No. 9 copper wire make a better connection than the ordinary telephone wire? What is the best thing to solder to the end of the wire for placing into the ground? How large should the ground plate be and how deep should it be buried in the earth? We are using common wire and iron rods, but the wire will rust off in four years' time and the rod will form a thick scale of rust, giving us poor service. I thought that copper wire would last longer and also give us better service. Please advise us if the size of the wire has anything to do with the matter when copper is used. J. F. W., Illinois.

In order to produce a satisfactory ground connection, it is generally best to use a copper wire and rivet it fast to a copper plate containing two or three square feet of metal. This piece of metal should be buried in the earth in such a way that the ground around the plate will be practically moist all the year around. It is generally advisable to first dig a hole down to fairly damp earth and then throw in a bushel or so of charcoal, placing the plate upon this and covering it with charcoal. The soil may then be replaced and you may be reasonably certain of satisfactory service. For the ground wire at subscriber's station nothing larger than a No. 12 or No. 14 copper is necessary, and even a smaller wire will do where it is not subjected to disturbances where the wire enters the ground.

In constructing ground terminals at a central office, it is necessary that the ground wire be made considerably heavier. A No. 8 copper should be used for a central office ground, and the distance should be as short as possible from the ground terminal on the switchboard to the point where it actually connects to the ground plates. The longer the wire the more chance there is for excessive cross talk. This, however, applies only when considering the ground wire at the central office.

I would like you to give me a simple cord circuit for a metallic toll line switchboard. I do not want any repeating coil connections, but must have some arrangement which will give good service. D. A., Mexico.



The diagram which we present below shows a two-conductor cord circuit provided with a three-lever, five-position combined ringing and listening key. It will be observed that the calling cord is connected to a pair of selector springs which are provided with back contacts, so connected that when the ringing key is drawn over in the signaling position, signaling current is connected to the calling cord and the answering cord circuit as well as the clearing out drop connections are entirely disconnected from the calling cord circuit.

The same is true of the answering cord, and with the circuits arranged as shown, we are able to signal either over the calling or answering cord circuit to the exclusion of the remaining cord circuit apparatus. Associated with the key, which controls the ringing out over the calling cord circuit, we have a listening key. That is, draw the calling cord ringing key over to the listening position and the operator's telephone circuit is connected to the line and to the exclusion of the clearing out drop, for it is frequently found that with the cutting out of even the clearing out drop permits of securing a more efficient talking service.

To the right of the listening key we have a set of springs facing each other. The front contacts of these springs connect to the operator's telephone set. These keys are provided for the purpose of permitting an operator to speak with a subscriber connected to the calling cord to the exclusion of a subscriber connected to the answering cord, and vice versa. The key towards the answering cord may be operated and a conversation may be held over the answering cord circuit without such a conversation being heard by the subscriber listening upon the calling cord circuit. The cord circuit as presented shows a method which has been applied in many installations and found to be perfectly satisfactory.

How should telephone batteries be tested for volts and amperes? If a battery tests one volt and no amperes, is it fit for use? Should batteries which are to be used in automobiles be tested in same manner as batteries for telephones are tested? H. M. O., Kansas.

If you have a battery which measures one volt, then it will depend entirely upon the internal resistance of the battery as to how many amperes of current it will deliver. You ask if a battery is fit for use when it tests one volt and no amperes. This condition it is impossible to conceive, for if you have one volt difference potential of the battery, then you are certain to have a flow of current from the battery in accordance with Ohm's law. That is, the current will be equal to the voltage of the battery divided by the external resistance, and the internal resistance of the cell. That is.

if a battery has a total internal and external resistance of one ohm and maintains a voltage of one, then there must be a current of one ampere flowing.

In order to test telephone batteries, the best way will be to observe whether the batteries give you anywhere between fourteen and eighteen amperes of current. If it does and the open voltage of the battery is somewhere near one and one-half, then you undoubtedly have a battery which gives the required current. Continued use, however, can only determine whether a given cell possesses lasting qualities. When it comes to testing automobile batteries, the same rule applies in a general way, excepting that it might be better to use a larger sized battery, giving somewhere between twenty and thirty amperes of current.

To the Question and Answer Editor:

The statement in your question and answer column that for an exchange of 300 telephones or less a magneto equipment is more suitable and less expensive to operate than a common battery system is one that we can hardly pass unchallenged.

With an exchange of 300 lines either a good type of relay board or ballast board will prove more economical to operate than a magneto system. In the first place the cost of power would be less in case the common battery is ballast, and only very slightly more in case the system is a relay board, than will the power required in magneto exchange. It must be remembered that a dry battery deriving its energy from a consumption of zinc, is about the most expensive way of obtaining electrical current that is in use to-day.

The maintenance of a common battery relay board in regard to trouble may be slightly more than a magneto exchange. On a ballast board it will be decidedly less. However, whether a system be ballast or relay common battery, the maintenance of the telephones will be far lower than the maintenance of the magneto telephones. The cost of the batteries is, of course, figured against the cost of the power when comparing a magneto to a common battery. The cost of installing batteries, however, changing them at least once a year, has no item to offset in common battery practice except the care of the switchboard itself.

Figures have been gathered showing the cost of a small exchange operating on common battery principles with power derived from a gasoline engine, and these figures will be submitted to TELEPHONY for publication next month. They show conclusively that with at least one type of board common battery systems are cheaper than a magneto system on any exchange from fifty lines up.—C. D. E., Wisconsin.

THE RESIGNATION OF A. L. WATERBURY.

The telephone and electrical men who are friends of A. L. Waterbury, and their name is legion, will learn with regret of his resignation as general sales manager of the American Conduit Company to take effect January 1, 1908.

Mr. Waterbury's private interests have grown to such proportions that he has found it necessary to take this step in order that he may devote his entire time to the different companies in which he is actively interested.

With Mr. Waterbury passing out of the conduit business we lose one of the pioneers of the Independent telephone industry. He started in the telephone business some twelve years ago, building a number of toll lines in central and southern Illinois, after which he engaged in a similar line of work in Minnesota. In January, 1899, he located in Houston, Texas, secured a franchise, organized a company and installed an Independent telephone system in that city. At that time Independent telephony was undeveloped in Texas and the construction of an Independent system was found to be a more laborious task than anticipated. The larger Texas towns had no Independent exchanges and the Southwestern (Bell) Telephone & Telegraph Company very bitterly opposed any division of its territory. Mr. Waterbury is the type of man who is not easily discouraged, and regardless of strenuous Bell opposition installed a modern Independent telephone exchange in Houston, which now has about 3,000 subscribers, the investment amounting to about $300,000. The concern building this system was the Citizens' Telephone Company, of which Mr. Waterbury was vice-president and general manager. When the system was in operation Mr. Waterbury severed his connection with the company and engaged in telephone work in various parts of the middle and western states and for the past four years has been connected with the American Conduit Company as general manager of the sales department for the

A. L. Waterbury.

United States and Canada. This position took Mr. Waterbury to every state in the Union, as well as through the Canadian provinces, and brought him into still more prominence with telephone, electric light and street railway men throughout this country and the Dominion.

When Mr. Waterbury took hold of the American Conduit Company's sales department the daily output was 5,600 duct feet per day, since which time it has increased to 30,000 duct feet per day, and even with the remarkable increase there have been times when Mr. Waterbury has oversold the quantity produced. With such a record it is indeed unfortunate that the conduit business should lose such a successful producer and so able a representative, as he is one of the most popular and widely known men in the electrical field to-day. It is to be hoped he will occasionally look in on the old friends who wish him an abundance of prosperity in his new work.

A SPECIAL WORD TO SUBSCRIBERS

In requesting change of address, always give the name of the post office to which your magazine is sent. Your name cannot be found on our books unless this is done. TELEPHONY is not returnable from the newsdealer. If you desire to purchase the paper from a dealer it will be to your advantage to notify him that you will want it, in order to insure his having a copy for you. If you wish to receive the paper regularly, please send in your subscription so that we can mail it to you direct.

Copyrighted, 1907, by The Telephony Publishing Company. All rights reserved.

Telephony

With which is incorporated The Telephone Magazine.
Published on the first of every month by
THE TELEPHONY PUBLISHING COMPANY
301-306 Manhattan Bldg., Chicago, Ill.

H. B. McMeal . . . . . President
E. M. McMeal . . . . . Vice-President
H. D. Fargo . . . . . Secretary and Treasurer
W. H. Graffis . . . . . Advertising Manager
H. A. Downey . . . . . Subscription Manager

Edited by H. B. McMeal and H. D. Fargo

VOL. XIV. TELEPHONY No. 6.
VOL. XXX. THE TELEPHONE MAGAZINE No. 6.

THE PRICE OF TELEPHONY

By subscription: One Dollar a year, postage free in the United States, Canada, Alaska, Cuba, Porto Rico, Mexico, and the Hawaiian and Philippine Islands. Single copies: 15 cents each.
In Foreign Countries in the International Postal Union other than those named above: Subscription, postpaid, per year, 10 shillings, 2 pence, payable by international money order ($2.50 in American money); Single copies, 11 pence each (22 cents in American money).

Entered at the Chicago Post Office as second class mail matter.

EDITORIAL DEPARTMENT

TO INDEPENDENTS.

THE Kellogg Switchboard and Supply Company is a Bell-controlled concern. As such it does not deserve the support of Independent telephone men. Every one who lends his assistance to the enemy by supporting the Kellogg company is endangering his own welfare and prosperity. Far-sighted Independents will not make the mistake of helping to build up what true Independents have tried to overthrow. TELEPHONY'S position is that the Kellogg company, as a Bell concern, is not entitled to the confidence or support of Independents.

OUR ANNIVERSARY NUMBER.

WITH this issue of TELEPHONY we complete our fourteenth volume and seventh year. Our January issue will begin our fifteenth volume and eighth year and will be our anniversary number as well as an International Convention and Electrical Show number. The January TELEPHONY will be the most important issue of the year and, we hope, in fact the best we have ever produced. With it we inaugurate many of the improvements we have planned during the past year. It has not been our policy to announce any of our plans in advance, so no mention can be made now of what the January TELEPHONY will be like. It will speak for itself when issued December 31, and we believe our readers will agree with us, when they see it, that a departure has been made in telephone publications.

The January number will be distributed at the electrical show and every telephone man attending the exposition and International convention may secure a copy with our compliments by calling at TELEPHONY booth. It will have a larger circulation than any previous number of this or any other telephone publication in the world. A standard will be set by this January issue which we shall live up to during the coming year, and which we expect will further strengthen our position as the leading telephone publication. We take this opportunity to again thank all those who have helped to make this publication one of the leading trade journals of the country, and will do all in our power to merit a continuance of the loyal support we have received.

COME TO CHICAGO IN JANUARY.

THE holding of the electrical trades' exposition and the annual convention of the International Independent Telephone Association simultaneously at the Coliseum, in Chicago, should prove a strong magnet to attract telephone men to that city next month. The electrical show opens January 13, continuing until the 25th, inclusive. The convention will begin January 21, and last three days. Present indications show that both events will be very successful. In fact, plans are being perfected to make them eclipse all previous records.

The officers of the International association are planning a programme that will be both instructive and interesting. Many of the state associations have been holding their conventions in the fall of the year, which is advisable, as this plan will aid in arousing interest in the January convention. The delegates and visitors at the Chicago meeting will have the opportunity of viewing the exhibits made by the telephone manufacturers at the electrical show, which will be of service to both the operators and the makers of apparatus. The value of the discussions, consultations and exchange of ideas that mark International conventions has been emphasized—and appreciated—too often for Independents to fail to recognize it, but the benefits of such proceedings increase from year to year.

Managers of the electrical show started out this year to make the coming exposition the greatest thing of the kind in the world, and have not spared effort or expense to accomplish this end. During the display of the exposition company it is confidently predicted that the Coliseum will present the most beautifully brilliant and brilliantly beautiful sight imaginable. The lighting and decorative scheme alone, it is said, will cost $25,000.

No Independent telephone man, who can come to Chicago January 13-25, should miss this chance to visit this veritable fairyland of color and light. The visitor will be

TABLE OF CONTENTS

Prominent Telephone Men	Thaddeus S. Lane	325	Questions and Answers	H. P. Clausen	354-357
Butte's New Telephone Exchange	R. D. Foster	326-330	Editorial	H. B. McMeal and H. D. Fargo	358-361
Telephone Power Systems	Thomas Lambert	331-336	Modern Toll Switchboard Equipment	J. E. Hilbish, J. B. Thiess and G. A. Joy	362-364
How to Judge Telephone Securities	Theodore Gary	337-339	The Use of Phantom Circuits	W. H. Hyde	365
Selective Party Line Systems	H. P. Clausen	340-341	Norfolk, Nebraska, System	W. J. Stadelman	366-367
Installation of Switchboards	W. J. Stanton	342-343	Service and the Service Man	E. J. Kennedy	368-369
Foiling an Eavesdropper	J. D. Archer	344-347	Manufacturers' Department	W. H. Graffis	370-388
Decisions Affecting Telephony	G. W. Hand	348-350	In the Rural Line Districts	O. H. Brandenburg	389-390
The Telephone as a Detective	R. B. Foss	351	Letters to Telephony		391
Digest of Telephone Patents	E. E. Clement	352-353			

doubly repaid—by the feast of reason at the telephone convention and the delight of the eye at the electrical display.

SOME STRONG RESOLUTIONS.

H. E. BRADLEY, secretary of the Pennsylvania State Independent Telephone Association, has sent TELEPHONY a copy of the resolutions on the Western Electric case adopted at the recent convention held by that organization. The substance of the resolutions was given in TELEPHONY's report of the convention, but as they state the issue so well we give space to them in full. They follow:

"*Whereas,* The Western Electric Company, a subsidiary company of the American Telephone & Telegraph Company (Bell), has persistently and unceasingly persecuted and harassed the Independent telephone interests of the country for the past twelve years by suits for alleged infringements of patents and by intimidating intending investors and subscribers by threats to bring such suits; and

"*Whereas,* These suits have been successfully defended largely at the expense of and due to the skill and energy of the Independent manufacturers of telephone apparatus, who have in the meantime produced and perfected apparatus far superior to that made by the said Western Electric Company; and

"*Whereas,* The said Western Electric Company at the dictation of the A. T. & T. Co. now offer to sell their wares outright to the Independent companies at cut rates with the object (if we may believe the press reports) of getting a footing with said companies, so as to ultimately assist the A. T. & T. Co. in disrupting the spirit of co-operation that exists between said companies through their state associations and the International association, and with the object of equipping such Independent companies as may buy from them with Bell apparatus so that they may eventually be connected with the Bell system and that this move is only a stepping stone with that end in view; therefore, be it

"*Resolved,* That the members of the Pennsylvania State Independent Telephone Association unanimously agree that they will not purchase or use, nor connect with any company that does use Bell telephones, switchboards or equipment made by the Western Electric Company; that any member so doing shall be immediately expelled from the association; and be it further

"*Resolved,* That the secretary of this association be instructed to send a copy of this resolution to the secretary of the International association and each of the state associations and to all of the trade papers."

A WARNING TO OPERATORS.

THERE is one feature of the campaign made by the Bell telephone manufacturing allies to drum up trade among Independent operators that the latter should bear in mind. It is believed that back of the Western Electric Company's entrance into the Independent field is a Bell scheme whose primary purpose is to check Independent progress in the telephone business and regain a monopoly thereof. In the early days of the struggle between the Bell trust and the opposition the Bell tried to hamper competition by refusing to sell telephone apparatus to new companies. "Wear our collar or you can't engage in the telephone business" was the ultimatum of the octopus.

What followed? The spirit of revolt against Bell domination would not be denied, and men came to the front to make Independent apparatus for Independent telephone operators. By instituting suits charging infringements of patents and resorting to all sorts of persecution—even to the burning of Independent telephones on public squares—the Bell continued its vain fight to keep the people subservient to its arrogant policy. But it was a fruitless battle to perpetuate a monopoly, and the Independents became firmly established.

Now the Bell is seeking other means to accomplish what it has failed to do. Its main manufacturing ally, the Western Electric Company, is openly seeking Independent business. In some quarters it is confidently stated that to get that business the Western Electric Company will cut prices ruthlessly. Why? To put Bell apparatus in Independent exchanges and thereby acquire a hold on Independent companies, facilitating the plan of the Bell to crush competition and recover a monopoly of the telephone industry.

No Independent telephone company should swallow the bait of cut rates offered by the Bell manufacturing allies. It spells disaster in the long run for the entire movement. Let the Independent operating field become loaded up with Bell apparatus, and a change in the complexion of affairs would immediately result. Cut rates for apparatus would vanish, the Bell trust would increase its efforts to disrupt the Independent movement and there would be trouble all along the line. Steer clear of the enemy's lure is the only safe policy to pursue.

A MINISTER'S TRIBUTE.

A MINISTER at Portland, Maine, recently delivered a sermon to his congregation, in which he paid the following tribute to the telephone operator:

"We, the public, are too little aware of the debt we owe to the telegraph and telephone operators. Think of the confidences we commit daily to the wires and how strictly our confidences are guarded. What patience is exercised, particularly by the girls in the telephone exchanges. Somebody must be quick and accurate in the service. Call your numbers plainly and repeat courteously when asked. Tired nerves are at the other end of the line and ought to have some consideration, and if you are a lady or gentleman out of employment and with nothing to do but gossip on the line, please do not plant yourself for a chat in the rush hour of the morning. The 'hello' girl will probably be blamed and your neighbors may fall from grace waiting on your pleasure. This is a busy world. If you are not busy, do not get in the way of those who are. I am told that fifty per cent of the complaints at the exchange come of the endless chaffing and gossiping on the lines by unoccupied women of the city."

THE CHICAGO BELL FRANCHISE.

AS WAS anticipated, the Chicago Telephone (Bell) Company has obtained an extension of its franchise from the city council, that body having passed the ordinance permitting the company to operate for a period of twenty years, after the expiration of its present grant. This result was reached only after a long and bitter struggle. Many and radical changes were made in the ordinance as first introduced by the company, but, while many concessions were forced from the Bell licensee, the feeling still exists in many quarters that a better bargain could have been made for the city of Chicago had the city council not been so anxious to favor the company. Ugly charges of corruption were bandied about during the fight, but none of them was in a sufficiently concrete form to induce the state's attorney to institute proceedings as was done in San Francisco where Bell officials were indicted and convicted of bribery.

The Chicago council—at least a majority of it—fell under the spell of the Bell licensee, its attorneys and lobbyists and in a session which lasted from 11 o'clock a. m. one day until 2 a. m. the next, voted down all important amendments offered to improve the ordinance and finally passed it with a few changes, to which the company representatives assented. There has been so much criticism of the preference of aldermen to serve the interests of the telephone company rather than those of the city that it is expected it will curtail the political careers of some of the council leaders.

A lesson which is to be learned from the Chicago fight

is that competition after all is the only effective safeguard the public has to preserve its rights in dealing with Bell companies. Had there been an Independent company operating in Chicago the city would have got a much better bargain. As matters now stand the Bell licensee has an extension of its operating rights with a surrender of only a portion of what it rightfully owes the telephone-using public. Its compensation to the city was grudgingly allowed as were its reductions of rates and, in fact, all other concessions. The 2,000,000 Independent telephones which lie within a radius of 350 miles of Chicago as yet have no connection with that city, which is greatly to Chicago's disadvantage. Some day there will be an Independent company operating in Chicago, for that city will not tamely submit to being marooned while all the territory surrounding is gridironed with Independent lines.

Following are the more important rate reductions provided by the new Chicago ordinance as passed:

Householder now paying $100 a year for single party unlimited service will get same service for $82. Householder paying $75 for two party unlimited service or $60 for four party service will get two party unlimited service for $56. Ten party lines, of which there are 40,000 in the city, abolished and replaced by four party lines for same guarantee of $1.50 a month. The four party line residence service now costing a guarantee of $3 a month, or $36 a year, will be had for a guarantee of $1.50 a month or $18 a year. Two party nickel telephone that costs now a guarantee of $6 a month or $72 a year, will be had for a guarantee of $3.75 a month or $45 a year.

In other subdivisions of the nickel service the subscriber will get two and a half messages for a guarantee of 12½ cents a day on a two party line, instead of guaranteeing 10 cents for one message or 20 cents for four messages as now. He will get four messages for 20 cents a day on a single party line, instead of guaranteeing 20 cents for two messages or 30 cents for six messages as now—all this for people who want a low guarantee so as to have a telephone for incoming messages.

The flat rate single party unlimited service business telephone at $125 a year has been retained for the benefit of business houses which do not want measured service. The mileage charge of $25 a mile, that runs up the cost of some telephones to nearly $400 a year in some of the outlying parts of the city, is abolished. The flat rate also entitles the subscriber to one, two, or three extension telephones at $6 a year each, instead of $18, as now. As to the reductions in measured service for business houses, under the new measured rates a subscriber will pay $60 for the first 1,200 messages, instead of $60 for 600 messages, $75 for 900 messages, or $90 for 1,200 messages as now. Above 1,200 messages he will pay 3 cents each for the next 2,400 instead of 4 cents each for the next 600, 3 cents each for the succeeding 1,800 as now; and thereafter he will pay, under the new rate, only 2 cents a message, instead of 3 cents as now. In other words, the subscriber will get for $60 that for which he now pays $90; for $69 that for which he now pays $102; for $78 that for which he now pays $114, and in large quantities he will get for 2 cents a message that for which he now pays 3 cents.

If the measured service subscriber will contract for 7,200 messages he will get an additional line free, and another line for each additional 6,000 messages, or he may have such lines for $24 a year without guaranteeing any particular number of messages. As a part of measured service, a subscriber may have a single, unlimited service line for $1 a day for use with private branch exchange. He will get a switchboard and private branch exchange apparatus without extra charge. Switchboards now cost from $36 a year up and extra single party lines for use with switchboards now cost $36 a year each, instead of $24 as under the new ordinance. Business houses requiring private lines connecting widely separated offices or parts of large plants will get them for $40 a mile instead of $100 for the first mile and $60 a mile thereafter, as now. The measured service clauses also provide for meters to register actual connections.

The neighborhood exchanges now in existence are retained with material reductions. Toll charges within the city of Chicago are wiped out by the new ordinance. For connections with communities outside of the city, within fifteen miles of the city hall, or not more than a mile outside of the city limits, the charge will be 10 cents.

The new ordinance cuts the price for using public telephones from 10 cents to 5 cents. This includes hotel telephones and all which have continued to get 10 cents a call.

Under the ordinance the city has the right, at the expiration of two and a half years, to revise the rates, but this may be done before then should the legislature authorize the city to fix telephone rates as it fixes the price of gas. The compensation to be paid by the company to the city is three per cent of the gross receipts, and it is the avowed purpose of the present city administration, if investigation shows that the company can afford to pay more, that the excess shall go to the telephone users in the form of reduced rates.

THE FUTURE OF THE INDUSTRY.

IN A paper read by Thomas Lambert before the Chicago branch of the electrical section of the Western Society of Engineers, which is published in full in this issue, there is much valuable information. Mr. Lambert, aside from being a good telephone engineer, knows something of the future development of the art, as evidenced by the closing paragraph of his paper. He says:

"In closing I want to make a statement that can scarcely be called a prediction, as it is more of the nature of plotting a curve from observed facts. In a very few years the telephone business will be the greatest in the world. Its growth is accelerative, and its value to the subscriber increases in a geometrical ratio with the number of subscribers within reach, and on this basis I think it is fair to presume the statement just made, that nothing can prevent the telephone business from becoming the greatest industry in the world, because it contains within itself the seeds of stability; it meets a need; it meets a want, and its influence on civilization will be most far-reaching. It will bring us together under one language; it will be one of the most potent means in the fraternalization of the world, and may yet be one of the greatest factors in the universal peace plan."

Mr. Lambert puts the matter tersely, and we believe our readers will agree with him fully. We are all part of a great industry, and it is our duty to do our share to bring the telephone to its widest usefulness.

AN APPROVAL.

"TELEPHONY, in its September issue, comes out boldly in denunciation of the methods employed by the revised edition of the Kellogg Switchboard & Supply Company. Originally, the concern in question was loyal to the Independent cause, but Bell officials, by underhanded methods, secured control, intending, evidently, to use it as a weapon against the Independents, with the ultimate object of forcing them out of business.

"The importance of positively refusing to countenance the Kellogg company as long as it remains in the hands of Bell people has been discussed at various Independent telephone association meetings; and TELEPHONY has asked its readers to give their views on the subject. Undoubtedly there will be a hearty response from representative telephone men throughout the country, as it is generally conceded that those who have risked their capital in the interests of the Independent movement should receive the exclusive patronage of Independent companies purchasing supplies."—*Western Telephone Examiner.*

BOOST; DON'T KNOCK.

DOWN in Texas, where there is plenty of room and the breezes blow freely over the prairies, the Denison Board of Trade is mailing out motto cards, one of which reads:

"Don't Be a Knocker.—Hide your little hammer and try to speak well of others. When a stranger drops in, jolly him; tell him this is the best town on earth—and it is. Don't discourage him by speaking ill of your neighbors. There is no end of fun in minding your own business. It makes other people like you. Nobody gets stuck on a knocker. Be a booster."

There is a world of truth and good advice behind the above words, despite their slangy sound. Everywhere one goes, the most useful, helpful man is he who is cheerful

and ready to think and say kind things about his neighbors, while the "grouchy" individual, whose eye is always looking for the faults and missteps of his fellows, is generally the reverse. It costs nothing to refrain from speaking ill of others—only the sacrifice of an inclination to say something mean, and such inclinations should be sacrificed. On the other hand, there is no way of estimating how much good can be done by a friendly "boost."

"Put yourself in his place," and nine times out of ten you will "boost" and not "knock."

NEBRASKA ASSOCIATION RESOLUTION.

AT a recent meeting of the executive committee of the Nebraska Independent Telephone Association held in Lincoln, the following resolution was unanimously adopted:

Whereas, The Western Electric Company, subsidiary company of the American (Bell) Telephone & Telegraph Company, has persistently and unceasingly persecuted and harassed the Independent telephone interests of the country for the past twelve years by suits for alleged infringements of patents and by intimidating intending investors and subscribers by threats to bring such suits, and

Whereas, These suits have been successfully defended largely at the expense of, and by the skill and energy of the Independent manufacturers of telephone apparatus, who have in the meantime produced and perfected apparatus far superior to that made by the said Western Electric Company, and

Whereas, The said Western Electric Company at the dictation of the American Telephone & Telegraph Company now offers to sell its wares outright to the Independent companies at cut prices with the object (if we may believe the press reports) of getting a footing with said companies, so as to ultimately assist the American Telephone & Telegraph Company in disrupting the spirit of co-operation that exists between said companies, through their state associations and the international association, and with the object of equipping such Independent companies as may buy from them with Bell apparatus so that they may eventually be connected with the Bell system, and that this move is only a stepping stone with that end in view;

THEREFORE, BE IT RESOLVED, That the members of the Nebraska Independent Telephone Association are requested not to purchase nor use, nor to connect with any company that uses (Bell) telephones, switchboards or equipment made by the Western Electric Company, and

BE IT FURTHER RESOLVED, That the secretary of this association be instructed to send a copy of this resolution to the secretary of the international association and each of the state associations and to all of the trade papers.

GREETINGS OF THE SEASON.

AT THE beginning of the last month of the year, TELEPHONY wishes its readers, advertising patrons and the Independent telephone field generally a Merry Christmas and a Happy New Year. It may be a trifle early to extend these greetings, but this is our only chance before January 1, and it is better, anyway, to be a little previous than too late in offering good wishes. The old year of 1907 now tottering toward its end has been an important one in the telephone industry. The financial stringency of the last two months may have clouded the review of the past year somewhat, but it is gratifying to note that Independent telephone companies stood the strain far better than concerns engaged in many other lines of business. Moreover, real progress has been made by Independents in the last year in every section of the United States and Canada. The position of Independent companies has continued to grow stronger before the public. The fact that there is an active aggressive competitor in the field against the Bell is known and understood by more people to-day than at the beginning of 1907, and they realize more than ever before that the Independent companies can and do furnish efficient and satisfactory service. In short, the Independents have made material advances. Nobody knows this better than the Bell, which has betrayed this knowledge in the last year as never before. Proof of this is found in the numerous instances in which the Bell eagerly sought to establish working agreements with Independent companies in many localities.

The International Independent Telephone Association has grown much stronger during the last year. In point of financial strength, number of members and general working efficiency the association is in better shape than a year ago, and will enter 1908 full of enthusiasm and energy to make a better record than ever. The state associations are similarly situated, as are the district organizations, and the 1908 convention to be held in Chicago next month will reflect the healthy condition in which the various bodies find themselves at the beginning of the new year.

As the American people advance and broaden they are certain to be drawn more closely to the Independent telephone movement. The principles on which that movement is founded—opposition to monopoly, advocacy of fair play, and home rule—are the principles which every good citizen deep down in his heart knows to be right and just. As our country progresses toward the condition which abhors oppressive trusts and forces great corporations to do their duty by the people that make them wealth-earners, the position of the Independent telephone movement is bound to grow more and more impregnable. The reason is that it is part and parcel of that phase of the national character. The Independent industry is steering in the right direction. Let us hold to the same course, and begin 1908 with an abiding faith that the achievements of the old will be outdone during the new.

THE COST OF MONOPOLY.

TELEPHONE users of Kenosha (Wisconsin) are getting a taste of telephone monopoly. The following from the Kenosha Courier tells the whole story:

"As the first result of the removal of competition in the telephone business, Kenosha is paying fifty per cent more for its telephones, but is there a single unprejudiced subscriber who believes that we are getting fifty per cent better service? However, we do not know that the public has any right to complain. Kenosha had a chance to enjoy competition and did not improve it, so that the telephone users themselves are the most to blame for present conditions."

THE TELEPHONE.

THE following verses were received at TELEPHONY office recently and, while the name of the author was not signed, we believe Theodore Gary, of Macon, Mo., is guilty. No action will be taken:

It saves you time in a thousand ways,
And time is money, you know;
It does your shopping on frozen days
When the winds of winter blow.
And if, when your orders are sent, you find,
Your wishes and wants have grown,
Or you'd like a change in measure or kind,
You can change your list when you change your mind,
By the use of the telephone.

You reserve your berth in the Pullman car
And your seats at the matinee;
You call your friends from near and far
For a feast or a holiday.
And if any accident should befall
You can easily make it known
To the guests you have bidden, one and all,
And save all trouble by making a call
Through your friend, the telephone.
Lastly, but not least, the bonds and stocks of good
Telephone companies are a good investment.

MODERN TOLL SWITCHBOARD EQUIPMENT

The Continuation of a Series of Articles Dealing with this Important Subject

By J. E. Hilbish, J. B. Thiess and G. A. Joy

ARTICLE VII

OUR discussion in the preceding article carried us through the lamp signal multiple toll board and consequently the method of dealing with toll connections with this type of equipment. We thereby completed the discussion of the most efficient and elaborate toll switchboard and thus finished our general description of the regular central office toll equipments. It is the purpose of this article, however, first to present one other circuit, namely, an interposition trunk for the above named system, and second to give a detailed description of the method of cabling and wiring toll line circuits and to show the method of interconnection at the distributing frame.

INTERPOSITION TRUNK.

The purpose and advantages to be obtained from an interposition trunk have been fully described in Article 5 of this series in connection with the magneto multiple toll board, hence we will only describe the method of operation of the circuit shown in Figure 23. In order to make the narrative of operation of this circuit as simple and clear as possible we have shown one-half of a regular toll operator's cord circuit at each end of the trunk. The jacks of the trunk circuit at the calling operator's end are, as shown, multipled in each section of the board, while the jack at the answering operator's end is particular to each individual operator.

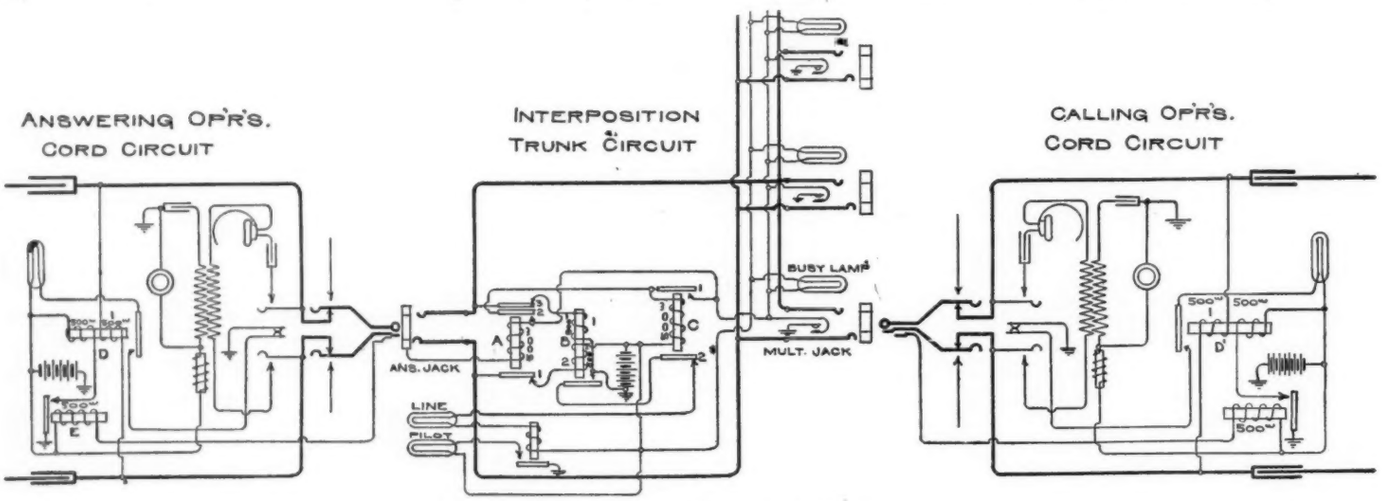


Figure 23—An interposition trunk circuit.

Whenever an operator desires to talk to any other operator in the exchange she will plug into the multiple jack. numbered to correspond to the position at which said operator sits, with one of her regular cords. The act of plugging into the jack accomplishes several results which will be described in the order in which they occur. In the first place, the busy lamps associated with multiple jacks of the line used will all be lighted, due to the fact that the act of inserting the plug into the jack will close the make contact in the same, wherefore a circuit will be completed, which can be traced from the ground on the make spring in the jack through all the busy lamps in parallel to battery. Thus any other operator has no excuse for plugging into the jack of a trunk that is in use, since the condition of the same is at all times indicated by the busy lamps. The second circuit completed by the original act of inserting the plug may be traced as follows:

From battery by way of coil *2* of relay *B* to the break contact and armature *1* of relay *A* to the ring strand of the trunk circuit, and hence by way of the ring strand of the calling operator's cord circuit through winding *1* of relay *D'* to the tip strand of the cord circuit, from where it can be followed by way of the tip strand of the trunk to armature *3* and the break contact of relay *A* through winding *1* of relay *B* to ground. Due to the completion of the above circuit relays *B* and *D'* will be energized and consequently attract their armatures. The attraction of the armature of relay *D'* will cause the lighting of this operator's supervisory lamp in the regular manner, and the attraction of the armature associated with relay *B* will complete the trunk lamp circuit which may be traced as follows: From the ground by way of the make contact and armature of relay *B* to the armature and break contact of relay *C*, and thence by way of the trunk lamp and pilot relay to battery. The lighting of this lamp will inform the called operator that she is wanted on the trunk circuit and she will therefore plug into her information trunk answering jack. The act of plugging into this jack will complete a circuit from battery by way of the coil of relay *E* and the sleeve strand of the cord circuit to the sleeve of the trunk jack, and hence by way of the coil of relay *A* to the make contact of the multiple trunk jack to ground. Thus relays *A* and *E* will be energized. The energization of relay *A* will cause the attraction of its armatures and consequently open the circuit containing winding *1* of relay *D'* previously traced, due to the operation of the break contact at armatures *1* and *3*. Therefore relay *B* will be de-energized and its armature will fall back, which will open the line lamp circuit previously traced, and thus extinguish the line lamp, and relay *D'* will also be de-energized, thus causing its armature to drop back, which will in the regular manner extinguish the supervisory lamp in the calling operator's cord circuit, thereby informing her that the other operator has

answered, and she will therefore operate her listening key, and is thus in a position to converse with the operator called. Due to the attraction of armature *2* of relay *A*, which is energized as previously stated, another circuit is completed which can be traced as follows: From the ground on the make contact of the trunk multiple jack to the make contact of relay *A* and hence by way of armature *2*, the make and the coil of relay *C* to battery. Thus relay *C* will be energized and attract its armatures. The attraction of armature *1* will lock this relay until the calling operator withdraws her plug by means of a circuit that can be traced from battery through the coil of relay *C* and armature *1* and the make contact of this relay to the make contact in the trunk multiple jack and hence to ground. The object of this locking circuit will become evident later on. The operators having completed their conversation will withdraw their plugs. When the answering operator takes down her connection the circuit containing relay *A* will be

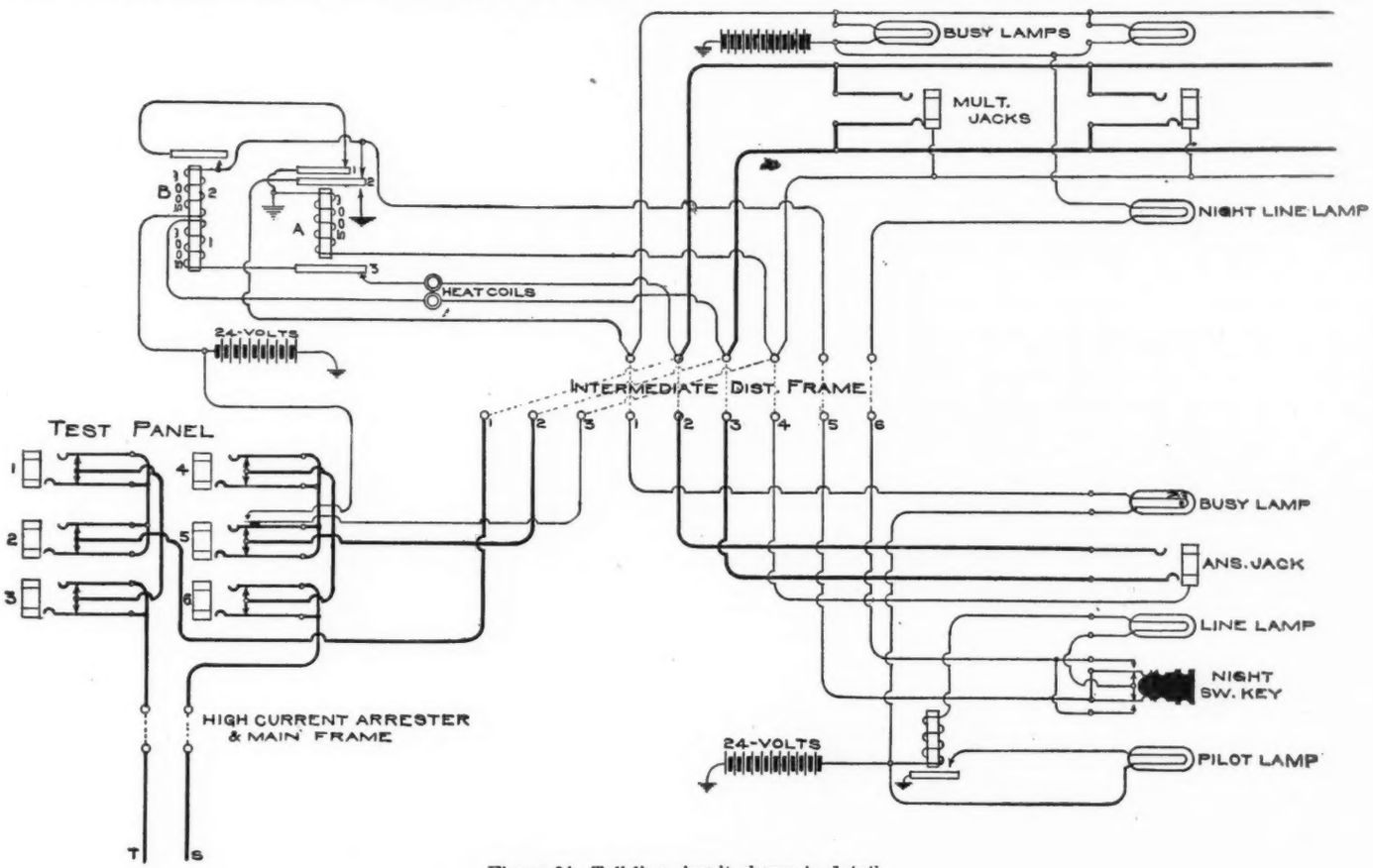


Figure 24—Toll line circuit shown in detail.

opened and the relay will be de-energized. Therefore its armatures will fall back which will again complete the circuit through the coils of relays *B* in the trunk circuit and *D'* in the calling operator's cord circuit, thus lighting the supervisory lamp. The trunk line lamp will not relight, however, due to the fact that relay *C* is locked upon itself, and thus the trunk lamp circuit is held open at armature *2* of relay *C*. When the calling operator withdraws her plug, however, she opens the jack contact, thereby releasing relay *C*, and she also opens the circuit containing relay *B*, thereby restoring the apparatus to its normal condition.

TOLL LINE CIRCUIT IN DETAIL.

The method of cabling and distribution of apparatus about to be explained and shown in Figure 24, is applicable to any system that we have described, and is the standard method of wiring a toll line circuit. It is also standard practice in wiring toll switchboards to make all talking circuits at least a No. 19 B. & S. gauge wire, while the signaling circuits are as usual for switchboard work, a No. 22 or a No. 24 B. & S. gauge, preferably No. 22, more for mechanical strength than for the greater electrical conductivity.

It will be noted by referring to the sketch that the toll line upon entering the exchange building is first carried to the high current arresters on the main distributing frame. The line at this point receives the standard protection, namely, fuse wire for current and carbon block lighting arresters for high potential. The toll line is then jumpered to the switchboard side of the frame, from where it is carried to the test panel. The description of this panel will be touched upon but lightly at present, as a fuller explanation of the same will be given in subsequent article. It will be noted that each line entering the exchange is represented at the panel by six spring jacks, three for each side of the line. These jacks are located in pairs and a twin plug is furnished with the cord circuits at the panel. The object of the three pairs of jacks is as follows: In case a plug is inserted into jacks, *3* and *6*, the switchboard end of the circuit is cut off by means of the break contacts in the jacks and the circuit attached to the plug is connected directly to the line. If the plug is inserted into jacks *2* and *5*, however, we find that a condition similar to that just mentioned exists, with the addition that the busy signal, associated with said line, is displayed at the board. The circuit containing the busy signal is completed by means of the make contact in jack *5*. Thus when a plug is inserted into this jack a circuit can be traced from battery by means of the jack contact to the intermediate distributing frame, and hence by means of the jumper through the cut-off relay *A* to ground. Thus the cut off relay is energized and the busy lamp lighted as explained in the preceding article. In case the plug is inserted into jacks *1* and *4*, it will be noted that the line side of the circuit is cut off and the switch-

board side is connected direct to the plugs. The object of the different arrangements will be explained in full later on, suffice to say for the present that jack pairs *1* and *4*, and *3* and *6* are used for simplexing and compositing, while *2* and *5* are used by the wire chief for testing out and *3* and *6* for testing in.

Having traced the line to the test panel we find that it is next carried to the intermediate distributing frame. The cable carrying the lines over is usually a thirty-three or a sixty-three-wire cable, as the lines are usually grouped for convenience in cabling in lots of ten or a multiple thereof, the extra three wires being spares.

The distributing board end of the cable terminates in a three-point terminal block and is jumpered from this block to the multiple terminal strip.

It will be noted that the answering as well as the multiple side of the line circuit terminates at the distributing frame in six-point terminal strips. The method of cabling these strips is as follows: The tip and ring springs of the answering jacks are connected to clips *2* and *3* of the answering terminal strip by means of a pair of No. 19 B. & S. wire carried in the intermediate to answering jack cable. Terminal clips *1* and *4* receive the wire from the busy lamp and the sleeve of the answering jack and are run as a pair in a separate cable. Terminal clips *5* and *6* connect with the night switching key by means of a pair of wires in still another cable. The three above mentioned cables each contain ten regular and one spare pairs. The cable containing the talking conductor being No. 19 B. & S. as stated above, and the other two, wires of No. 22 B. & S. gauge. Although we are running in sufficient cable to care for ten answering jack equipments, it by no means signifies that ten lines are to terminate in an operator's position. It is customary to furnish equipment in the answering jack space for more lines than will be possible for the operator to handle for various reasons, chief of which are, first, that standard apparatus for the answering jack equipment is usually made in strips of ten, and second, should trouble develop in one of the lines beyond the answering terminal strip, the lines can be jumpered over to an idle circuit and thereby the tying up a toll line due to local trouble is avoided.

Having disposed of the answering terminal strip, we will now devote our attention to the multiple terminal. It will be noted that on this terminal, as on the answering, clips *2* and *3* are reserved for the tip and ring of the multiple jack, and here as before they take a pair of wires in a cable of No. 19 B. & S. gauge wire. It will be observed, however, that in addition to the wires just mentioned, we will also find a pair of wires fastened to the terminals that are cabled to a pair of heat coils, from where they are cabled to the relay rack. These heat coils may be located on the relay rack itself, in which case the question of cabling is somewhat simplified, or they may be located on the main distributing frame. These coils when located on the main distributing frame are usually, for convenience in mounting and manufacturing, made up as standard sneak current and lightning arresters, the same as used in local exchanges. In this case it is customary to use dummy carbons in place of the standard carbons and micas. The introduction of these heat coils is to guard against sneak current which might get past the larger fuse at the high current arrester frame, and thus get into the coils of the relays and cause a burn out.

To continue with the cabling, we find that clips *1*, *4* and *5* are also cabled to the relay rack, these wires being carried in one cable as a pair and a single wire. There are now three wires remaining in this terminal that have not been accounted for, namely, the one to the busy lamp, to the sleeve of the multiple jack, and to the night line lamp, the first two are wired in a cable as a pair, and the third in another cable as a single wire, and take clips *1*, *4* and *6* respectively.

Having accounted for all of the wires on the terminal strips at the frame we are now ready to take up the method of jumpering. Since in a toll circuit, as in a regular line circuit, the signaling apparatus is associated with the multiple, the wires from the test panel are jumpered direct to tip, ring and sleeve clips of the multiple terminal strip, while clips *1* to *6* of the multiple terminal strip are jumpered direct to clips *1* to *6* of the answering terminal.

Now in order to show how the detail just described works out practically, we will trace the path of the current for an incoming call by means of the detailed circuit.

A subscriber having operated his generator will send an alternating current to the exchange which will seek the following path: From the high current arrester on the line side of the main frame through the jumper and the terminal spring to the make contacts of jacks *3*, *1* and *2* respectively, and then to clip *1* of the three-point terminal. From there it may be traced by means of the jumper to clip *2* on the multiple terminal, and hence by way of the heat coil to the make contact of armature *3* of relay *A*, to coil *1* of relay *B*, to the other heat coil from where, by way of clip *3* of the multiple terminal, the jumper wire clip *2* of the three-point terminal and the three jacks on the test panel it can be traced back to main frame and the sleeve side of the line. Consequently, relay *B* will be energized and permanently locked, due to a circuit that may be traced from battery to coil *2* of relay *B*, and hence by means of the make contact of this relay and its armature to the break contact and armature *1* of relay *A* to ground. This will cause the lighting of the line and busy lamps. The circuit containing the busy lamps can be traced from the ground on armature *1* of relay *A* by way of the break contact to the armature of relay *B* and its make contact to the break contact and armature *2* of relay *A* to clip *1* of the multiple terminal. From here the lamps associated with the multiple jacks are wired in multiple to battery, whereas the answering circuit for the busy lamp can be traced through the jumper to clip *1* on the answering terminal and hence through the lamp to battery.

The line lamp circuit can be traced from battery through the pilot relay and the switching key to clip *5* of the answering terminal and from there through the jumper to the same clip on the multiple terminal, and hence to the make contact of relay *B*, and its armature to the break contact and armature *1* of relay *A* to ground. In case the night switch is operated we see that the circuit is shifted to the make contact of the switch from where it can be traced to clip *6* on the terminal and then by means of the jumper to clip *6* on the multiple terminal, and hence through the night line lamp to battery. Now, when the operator answers by plugging into either the multiple or answering jack, we see that since the sleeves of these jacks are commoned by the jumper wire connecting clip *4* of the multiple and answering terminals, that the cut-off relay *A* will be operated and the line lamp extinguished. This is due to the fact that battery exists on the sleeve of the plug, and therefore the act of inserting the plug transfers it to clip *4* of the six-point terminal strip, and from this point the circuit will be completed by way of the coil of relay *A* to ground.

The operation of relay *A* removes the signaling apparatus from the line and transfers the busy lamp circuit ground to armature *2* of relay *A* was explained in the preceding article.

Three telephone lines have been erected on the Upper Senegal and Middle Niger, in French West Africa, connecting Haves and Medine, Kita and Bammako and Bammako with Kulikoro. Connection will shortly be made with Timbuktu.

THE USE OF PHANTOM CIRCUITS

A General Discussion of Such Circuits Showing How They May be Successfully Applied

By W. H. Hyde

A NUMBER of operating telephone companies have during the past year increased their toll line facilities by applying a phantom circuit to every two metallic telephone circuits wherever such phantom connections could be applied. The companies thus produced a third or phantom circuit where previously only two physical circuits existed, thus increasing the number of available circuits one-third and at very little additional cost.

A very encouraging feature in the application of phantom circuits is that the service given the public is as good

Figure 1.

over the phantom line as frequently may be had over the physical circuits, the transmission over the phantom lines being perfectly clear and free from all outside disturbances; this being true, of course, only after the necessary transpositions and circuit connections have been carefully and efficiently carried out.

The cost of transposing two physical circuits so as to take care of one phantom circuit will average about $5 per transposition, and, assuming that there is on an average only one transposition every two miles, this will give us a cost of $2.50 per mile for material and labor. Of course, to this we must add the cost of the necessarily special repeating coils, which are installed at each end of the line, and which are not included in the above price. The average cost of suitable coils is about $15 each, and one coil will be required for each terminal of physical circuits; that is to say, to produce one phantom circuit from two metallic circuits, it will require four special repeating coils.

With regard to the transpositions required in making up a phantom circuit, these are necessarily special, and may be described as follows:

Type No. 1 is used when only one of the circuits is to be transposed.

Type No. 2 shows the transpositions of the remaining circuit.

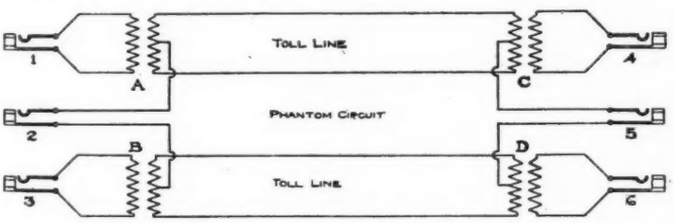


Figure 2.

Type No. 3 shows the circuit without any transposed connections.

Type No. 4 finally shows the arrangements when both circuits have been transposed.

In making the transpositions upon the poles a four-point transposition bracket is used, this having spiral insulator pins, and is attached to the cross arm with the insulator pin facing away from the pole.

On newly constructed circuits, the phantom transpositions can be installed without cutting the wires, it being necessary, however, to cut the wires if the transposition proposed is introduced upon existing physical circuits, and it is further necessary to cut out the old transposition at such poles where phantom circuits are being transposed, the new phantom circuit transposition being cut in, one every two miles.

For illustrating the transposing of physical circuits to make up phantom circuit connections, reference is made to Figure 1, which shows an eight-mile section of line carrying two physical circuits and one phantom, with the necessary transpositions cut in as shown. Figure 5 shows the connection of a special repeating coil, and also shows the different circuit connections to the switchboard.

In order to obtain the best results from a system of phantom circuits, no local or intermediate stations should be connected to the lines, as it is almost impossible to secure good results unless the local stations are removed.

Under circumstances where a toll line passes through a local station, it is best to string a new lead and retain the through lines for the toll service. This not only improves the phantom service but also permits the telephone companies to check all toll business originating at the intermediate stations.

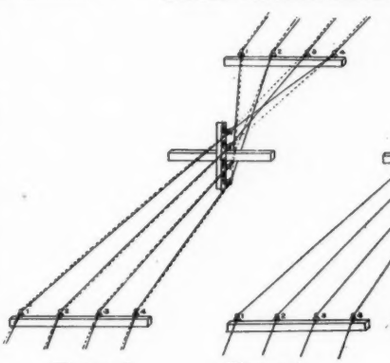


Figure 3.

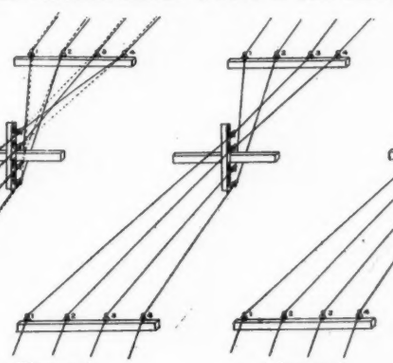


Figure 4.

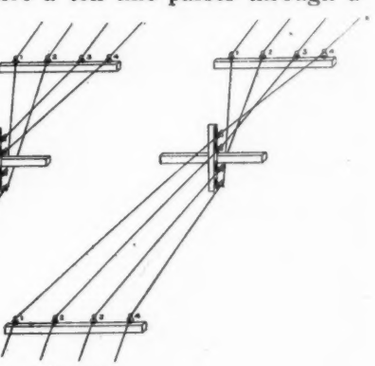


Figure 5.

THE HOTEL TELEPHONE.

Travelers in comparatively small cities often wonder how the local hotel can afford to install a telephone system with a station in each room.

"It is really a profitable matter," said a well-known hotel man. "The telephone system saves the landlord money. It not only reduces the number of bell boys, but in a small hotel it makes operators unnecessary, since the clerks are able to operate the switchboard besides attending to their own duties."

The hotel bell boy no longer climbs the stairs nor ascends in the elevator to pound on the door of the guest who wishes to take an early train. The telephone answers the purpose and does it more successfully, for the average man is so imbued with the importance of the telephone as a business agent that its ringing brings him out of bed promptly.

REPARTEE.

Louis Grouch (having trouble with the operator)—Hello! Hello! What's the matter! Is there some fool at the end of this wire?"

Operator—"Not at this end."—Operating Bulletin.

NORFOLK (NEBRASKA) SYSTEM

A Description of the Underground Construction, with Illustrations

By W. J. Stadelman

MR. THEODORE GARY'S remarks in the last International Independent Telephone Association Bulletin stating that the present Independent telephone construction is of a high standard and far superior to the work that has been done in the past, has prompted me to submit photographs accompanied by detailed description of the manner in which we have been putting our underground system in at Norfolk, Nebraska, a city of 5,000 inhabitants. We believe we have used the latest and most improved methods for this class of construction for a plant of 1,250 capacity. We are laying some 8,500 feet of underground and while the initial cost over aerial construction seems somewhat great, we thoroughly believe that the saving in maintenance and the efficiency in service that we will be able to give will amply repay us for the additional outlay. To start with the manholes are of the oval type laid up with hard burnt brick with cement mortar using a heavy cast iron square cover; size of manhole is four feet wide, six feet long, five feet six inches deep and is shown in Figure 1. Instead of laying the tile completely in concrete our engineer, John A. Duncan, formerly of Sioux City, Iowa, made an experiment with cement joints which proved so successful that we adopted his plan and are more than satisfied with the results.

Figure 1—Complete four way run and oval manhole ready for cover.

This new departure in underground shows a saving from twenty to twenty-five per cent in the laying of tile when the comparison is made with complete concrete. We do not deem it at all necessary in cities under 25,000 inhabitants to give the underground work the same expensive concrete protection that would be necessary in larger cities. Careful tests of the tensile strength of the cement joints which were made of two parts of cement and three of sharp sand, made in the manner as shown in Figures 2 and 3, were found not to be lacking in any particular. This illustration shows the making of an experimental joint only; the regular work is done in the ditch.

Figure 4 shows two men breaking a two-way joint. Outside dimensions of tile are nine inches by four and one-half inches, with a total length of four feet; this same joint stood hardening for three days before strength of same was tested; it then took these two men's combined weight of 375 pounds to break it.

In preparing the ditch we found that the bottom should be carefully leveled with a square point shovel in order to give alignment for the seating of the tile. This is very essential when using only the cement joints; two or three trowels of cement are put in the ditch at the point where the joint is to come; thereupon is placed the perforated metal wrapper which measures three inches wide; this forms the tie, and the same acts similar to an expanded metal lath; upon this is placed the joint of the tile. Dowel pins are used, the metal wrapper is secured up around the joint and cinched tight by running the end through the wire loop and folding back smooth in place, the cement is then spread

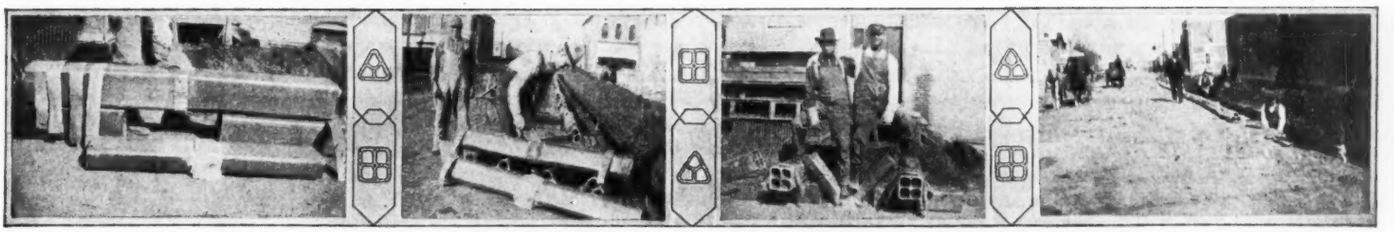


Figure 2. Figure 3. Figure 4. Figure 5.

over the wrapper to a thickness of about one inch over the center or heaviest place and tapers slightly to about one-half inch thickness making the joint eight inches in width. This process is shown by Figure 2 in which we made an experimental joint of a four way duct. It will be noticed in this picture that the metal strips are lying across the left hand side of the tile, also that there is one strip at the right hand side in the proper place for the joint. In the center strip the metal has been cinched up in place, and the mason is in the act of putting on the cement. Attention is called to the two way joint which is completed; this is the same joint that was afterwards broken as shown in Figure 4.

When the cement sets there is a perfect band around every joint in the tile which makes the entire run practically as strong and substantial as a single tile and for all purposes equally as durable, especially for service in cities of our class where the traffic is light and where the water, gas and sewerage men have little repairing to do and the streets are seldom opened. Figure 5 shows the laying of three way tile and Figure 6 shows three way tile laid, Figure 7 gives a view of ditch with four way tile joints, Figure 8, Engineer Duncan and Figure 9, noon hour. For the benefit of those who like figures I will submit the actual cost per duct feet. It must be borne in mind that labor in an agricultural territory such as ours is extremely high during this season of the year, or we could have made a better showing. The cost per duct foot was two way $.109, three way $.099, four way $.091, average $.0996. Estimate cost per duct foot where we used concrete over all is two way $.169, three way $.159, four way $.151, average $.1596.

With the building of this system there is a great activity in the telephone field in the northeastern part of the state. Norfolk's plant is well under way, having all the underground work completed, pole lines set, slugging and guying done and messenger strands strung. It will be an automatic, all cable plant with the downtown district underground, a two story pressed brick building is being put up and service will be given not later than January 15, 1908. The company will be known as the Norfolk Long-Distance Telephone Company, with a long-distance line built to Hoskins, at which point the company expects to make connections with the New State Company of Sioux City. The latter company is at present building a gap from Wakefield to Hoskins. When this line is completed Norfolk will have long-distance connections as far north as Minneapolis and St. Paul. This connection will also furnish good copper service via Sioux City to Council Bluffs, South Omaha and Omaha and points east. The Norfolk company is also building long-distance lines in its own county which will give it a southern outlet through Columbus and Fremont and these lines will be connected with the long-distance lines of the New State Company which will be built from Omaha west along the Union Pacific, taking in the territory covered by Fremont, Columbus, Central City, Grand Island and Kearney. When these proposed lines are completed the eastern half of the state of Nebraska will be well taken care of by copper connection on first-class standard construction. In the immediate territory tributary to Norfolk there is now under way considerable building which will be completed or at least in service before the first of the year.

Hoskins has just installed a new plant which will start out with about 200 subscribers. There has also been a new company organized at Madison which is now building a first class up-to-date exchange in the town of Madison which will compete for business with the sub-license company now operating there. The new company has some 200 farmer line connections at present and most all of these subscribers are stockholders which puts them in position to command the support of the local people at Madison. The exchange will open with something in the neighborhood of 400 subscribers. There is a long-distance line being constructed at present between Norfolk and Battle Creek; this line will be continued along the Chicago & Northwestern Railway, at least to Tilden and in the spring will go on west along the Chicago & Northwestern in order to give the Independent plants in the territory an outlet. All construction that is being put up is standard in every particular and will be capable of giving a first-class and efficient service.

THEATRICAL WORK DONE BY TELEPHONE.

Frohman, the American theatrical manager, said recently after his London business was over: "Two-thirds of the communication in London that two or three years ago was settled by correspondence or calls is now done by telephone. The result is a man's work is more concentrated and he gets more time. In perhaps a hundred or more engagements I might have during the day half are settled by telephone, even to engaging actors and listening to musical lyrics. I have decided more stage questions this year this way than by correspondence or personal meetings. In fact I have engaged two star actors and made arrangements with three authors for plays without ever having met them."

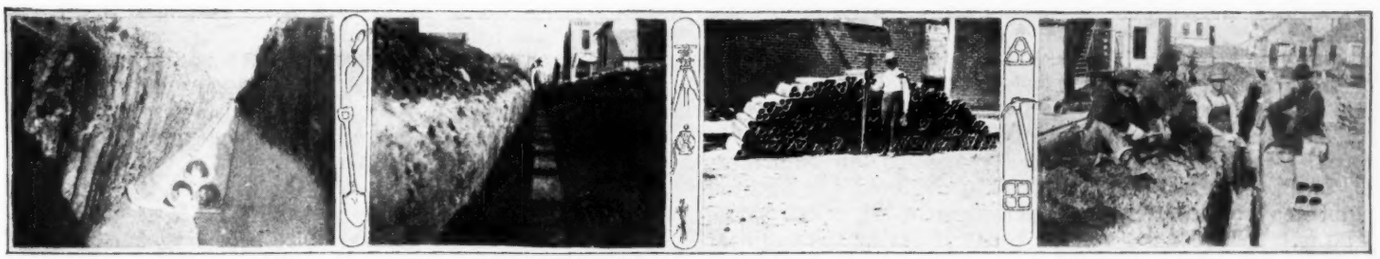


Figure 6. Figure 7. Figure 8. Figure 9.

SERVICE AND THE SERVICE MAN

An Important Factor in the Management of Successful Telephone Operating Companies

By Edwin J. Kennedy

TO THE average subscriber—be he a business man whose telephone service means an actual gain or loss of thousands of dollars, according to the value of that service, or a purely residential subscriber whose telephone is used probably only several times a day—the multitude of onerous duties which go to make a service are things, apparently, of little moment. To the busy financier with his many affairs of the day, who wants his stock broker, and wants him quick, perhaps, to cancel an order which means in that one precise instance a matter of thousands—to this man, I say, the telephone is the servant of the moment, and it is absolutely imperative that it be one of the utmost efficiency.

Good service, made up of quickness and dispatch on the part of the operator, combined with courtesy and a desire to be always obliging, will go far towards establishing a state of affairs bordering on a service of appreciation.

Indifferent service, in nearly every instance where this trouble is prolonged for any length of time, only results in making subscribers irritable and unsatisfied so long as the trouble lasts, and will, in every case, go far towards destroying the good feeling which should ever exist between subscribers and the operator who answers his call.

Bad service, which in a well-managed exchange should never exist for any length of time, causes the subscriber to overstep that line (an imaginary line of grace as it were, within which bounds all companies can safely work) wherein all patience has been destroyed and personalities are entered into which often tend to make the breach wider. And this rule applies along the whole line of service, from the man of affluence whose conversations are on the plane of high finance to the most humble subscriber whose service means to him, perhaps, only a few cents daily.

Good service always is not an impossibility, and, when you realize the fact that all telephone companies are organized to give good and efficient service, then public demand for efficiency, keen competition and rivalry (especially in these days of the widespread movement of the Independent companies) combined with good management and competency in the heads of departments, will, or should, insure that good service to which every subscriber is entitled.

Indifferent and bad service—and by this I do not mean a service which is bad to one or two subscribers only, but which throughout the whole exchange is the rule and not the exception—may, aside from any mechanical deficiency, arise from several different sources, chief of which are lack of system and incompetency in the heads of departments. This incompetency may not always be due to the lack of knowledge or intelligence of the work in hand, but rather to antagonism between departments which must surely go far towards destroying any effort made at carrying forward a systematic handling of the work. This does not apply so much to small exchanges, but I speak now of those exchanges whose volume of business requires, besides the general manager, a full staff of representatives whose duties are to look after various departments of the work of which they are the nominal heads. These range all the way from engineer of construction through each line of work and embrace the following: Superintendent of construction, who is responsible for all new construction by the engineer and the general manager; superintendent of installation and equipment, who is responsible for all the new installation; traffic manager, who is responsible for all new business and that already maintained; wire chief, who is responsible for all trouble on the lines, cables or equipment, for the immediate remedying of same and for a complete and accurate record of all trouble being kept for future reference; and the chief operator, who is responsible for all that occurs in the operating room, and for the operators individually and collectively while operating. This list of officials, their duties and their responsibilities takes us through the whole system of maintenance and construction.

Now to come to the subject of this article, service, the service man and his sphere in telephone practice of to-day. Few companies maintain an out and out service man. So far, perhaps, they have failed to see the necessity for one, but they will sooner or later. In soliciting for his consent to allow them to place him on their lists as a subscriber at so much per year or portion as the case may be, all companies see to it that they are well represented by one who goes to some pains in explaining the advantages, the merits and the absolute necessity why Mr. Jones should have their telephone. This representative talks very pleasantly, makes promises and secures Mr. Jones as a subscriber. The contract signed by Mr. Jones goes through the contract department and is hurried on through all the respective channels from the placing of the telephone in Mr. Jones' office to supplying him with a service. So far so good. Mr. Jones is now one of the company's numerous subscribers and the next representative call made by the company is for the amount due as rental for the intervening time.

Mr. Jones has had trouble on his telephone? Yes, many times. He has reported it and the company has sent men to fix it. This man, probably, volunteers no information whatever regarding the nature of the trouble nor possibly how to avoid it in the future. The trouble comes up again is reported and fixed. Now he is having trouble with his operator; she will not answer his call promptly and is inattentive. He reports and the trouble is apparently attended to. The trouble still exists, however, and the subscriber is forced to write a letter to the manager, which he proceeds to do in no hesitating manner, scoring the service and all who are connected with it.

So it goes on from day to day. Subscribers in all large centers experience this trouble from time to time, and the letters from dissatisfied subscribers to the manager and the trouble department number quite a few during a week's time.

There is not the shadow of a doubt but that the company is doing all that lies in its power (according to its system) to satisfy all and every subscriber, but it is an utter impossibility for the manager of a large exchange to answer personally all letters of complaint. The mere fact that they are not answered, however, does not prove by any means that the complaint has not been attended to. There is, however, always a feeling of dissatisfaction somewhere in the air between an operating company and some of its subscribers. This state of affairs, no doubt, will exist more or less as, no matter how good the service is, generally speaking, there remains the possibility of some portion of the mechanism in the central office becoming out of order which would mean trouble on one or more lines for the time

being. This, however, is granted, but the feeling of general dissatisfaction is that caused by lack of system or the failure to see that the system is lived up to.

This is where the service man steps in and shows his worth. He should be a man familiar with every department of the work; a man who can be depended upon for integrity of purpose and who is capable of handling his duties in the best interest of the company employing him and in the interests of the subscribers also, for when he is pleasing his subscribers he is doing good work for his company without a doubt. To do this requires tact, the ability to talk intelligently and in a businesslike way, a thorough grasp of the subject under discussion and an air of sincerity. He must be a man of firm resolve and be able and willing to shoulder all responsibilities for the time being, when talking matters over with a subscriber who is nursing a grudge against the company. He is the man whom the company should depend upon to straighten out any little difficulties which may from time to time arise between subscriber and operator and to smooth the path for future service. Every individual complaint from subscribers should be looked into. It does not matter how trivial the complaint may appear.

Where complaints fail to be remedied after several attempts, it is the service man's manifest duty to determine just where the trouble lies, take it up with that department and see to it that the trouble is remedied and that at once. It does not matter whether the trouble lies in the subscriber's telephone, in the cable box, in the rack room or in the operating room, the trouble exists, is a detriment to good service and must be removed. Given a good service man, one who knows how to handle himself among men, and these cases can be looked after without the slightest antagonism arising between his department and those departments which for the time being he has had to call to account. He is responsible to the manager for good service and he must see to it that this service is maintained.

So much for the man, now for his system. Is system essential? Not a system which has grown from habit into the channel of red tape. Most assuredly not. But a system wherein all temporary schemes are banished and only those ideas which, when brought into effect, go to make up a service of the utmost reliability, ideas which individually are of the utmost importance and collectively form a part of the system which cannot readily be overlooked.

I will not attempt to go into detail regarding a perfect system as it would take too long. However, an outline will suffice to show how it might be handled. In the first place he should have his operators under perfect control from the moment they report for duty until the day's work is over.

Everything pertaining to change in time of duties or hours and all rules and regulations should be posted in the cloak or retiring room. There should be no disorder or unnecessary changing in the operating room, and once the operators enter the room for duty they should be subject to the supervision of the chief operator and her assistants. Strict rules should govern the operators and their work, making, of course, all due allowance for the physical comfort and welfare of the operator. A personal feeling of appreciation between operators and the chief and her assistants also is essential. Operators should always report any incivility on the part of the subscribers, and vice versa to insure proper service.

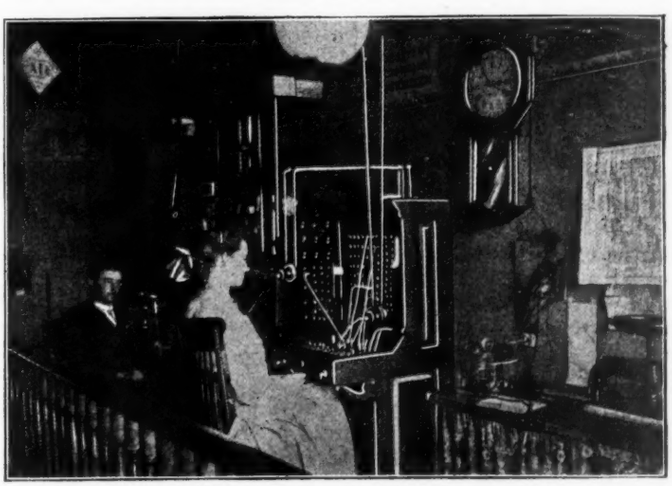
This outline system maintained and extended in the operating room, cutting out all personal elements and using only good sound business methods, combined with a perfect system of looking into trouble reports and remedying them, will go a long way toward making an ideal service. However, there is one thing more. Too wide a gap is left between the subscribers and the operating company. The subscribers should be brought into closer touch with the existing condition of affairs. I do not mean that a rigmarole of facts should be placed before him regarding the handling of the exchange, etc., but a service man should be employed, who, when a subscriber complains of service in any way whatsoever, will see to it that this man is convinced that his complaint is being looked into intelligently, and that if necessary the service man will pay that man a personal visit and then and there go into the matter of his specific complaint, explaining to the subscriber how these things can occur perchance many times a day. Explain to him how trivial cases of annoyance are let go by unnoticed which, if looked into at once, would have prevented larger and more serious troubles. Explain this feature of the business or that feature regarding operating, taking, him into your confidence to some extent and going to some trouble to explain to him that you appreciate his dealings with you, that you appreciate the fact that he is one of your subscribers. Do that and you will benefit the whole service immensely. This, then, is service and the duty of the service man.

To the man who fills this position for a telephone company—"superintendent of service," "manager of service," or whatever you have a mind to call him—to this man, I say, the subscribers in time come to look for redress, and in nine cases out of ten they get it to their satisfaction. Business men and private individuals as well, when having trouble, are pleased to talk and discuss the matter with one who they believe knows what he is speaking of and thoroughly understands the nature of the trouble, who can put his hand exactly on the spot and have the trouble removed.

Then, again, the mere fact that a representative calls to inquire about possible improvements in the service gives the subscriber the additional feeling that his interests are being well looked after. Moreover, the company must feel that, with a good reliable representative out amongt the subscribers all the time, taking many of the heavy responsibilities from the manager's shoulders and treating these responsibilities as they should be treated personally and at once, it is being helped considerably to extend a business which depends not at all on any human element or personal contact between subscribers and operators, but upon good sound business dealings, which, in an operating telephone company, means good service. That means service handled intelligently and in the proper spirit between a company in which the departments all work together in unison, and where the subscriber is met half-way.

INWOOD (IA.) CENTRAL OFFICE.

The Inwood Telephone Company of Inwood, Iowa, is one of the flourishing Independent companies which abound



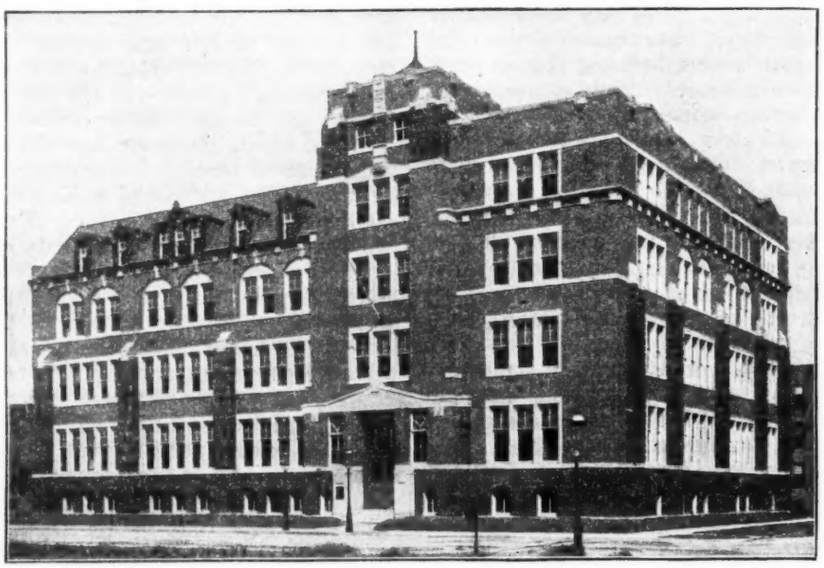
in the Hawkeye state and have made it the banner telephone state in the Union. The accompanying illustration shows the central office at Inwood.

MANUFACTURERS DEPARTMENT

BUILDING FOR THE AMERICAN SCHOOL OF CORRESPONDENCE.

The building recently erected for the American School of Correspondence, Chicago, is of particular interest from both the architectural and the educational point of view. If it is true that a building reflects the character of its occupant it is easy to read the story of the American school, for this new home of home study is marked by solidity, dignity and usefulness. In its external, visible lines, it harmonizes perfectly with the practical purposes of its design and the dignity of its surroundings; and it is also a center from which radiate invisible lines reaching to the very ends of the earth. For here are the headquarters of the largest institution in the world devoted exclusively to correspondence instruction along technical lines—a quiet but forceful factor in the distinctly modern machinery of education, whose enlisted army of ambitious workers answers its roll-call from every quarter of the globe.

The structure thus partakes to some extent of the nature of an office building as well as a school. Its design was, therefore, a complex problem dictated by several different considerations. First, of course, was its intended use as a school and a center of administration; but a factor of almost equal weight was its location. It stands in the immediate vicinity of the magnificent Washington Park and the Midway Plaisance of World's Fair fame, now an essential link in Chicago's great boulevard system. Thus it has the advantages of surroundings of great natural beauty and artificial adornment. And, in conjunction with the University of Chicago, whose administration offices stand only two blocks away, the school is itself destined to be as instrumental in making this the educational center of the city, as it has been in making Chicago the center of correspondence instruction.



New building American School of Correspondence, Chicago.

This location dictated for the school a design that would in no wise conflict with the architectural scheme of the other educational structures, which in increasing numbers are arising in the vicinity. The problem was to combine in the exterior design of a single structure the picturesqueness appropriate to collegiate architecture and the solidity and stateliness required in an office building. This scheme has been worked out in the utmost simplicity by the architects, Messrs. Pond and Pond, Chicago.

The materials of the exterior are paving brick of two shades, with Bedford stone for enrichment, and moss-green tile in the roof. The brick used in the basement and projecting corners of the rustications is of a purplish red, somewhat darker than that used in the body; its depth of tone is strengthened by its being laid with dark joints. The brick in the body of the wall is a medium warm red, variegated enough to have life and pleasing texture; its general contrast to the darker material is emphasized by its being laid with white joints, and by the white finish of the window sash and frames.

The building faces south. It contains four stories and basement. The general interior plan is that of the letter E: the return of the east and west wings encloses on two sides an open court, 60 feet square, walled in at the rear and entered through an arched driveway.

The note of green struck in the roof tiling is carried throughout the interior wood finish of the building which is of quartered oak; the notes of purple and red reappear in the wall decoration, and the red in the polished granite of the entrance steps. Red is also present in the flooring of the vestibule and corridor on the ground floor, which consists of plain red English quarry tile laid with broad, dark joints and relieved by occasional mosaics of glazed and vari-colored tiling. The general interior color scheme is seen to best advantage in the vestibule. The high oaken wainscoting, the ceiling beams, and the furnishings are tinted a soft green; the walls and ceiling panels a warm buff, relieved with unique, conventional flowered designs in red, green and purple—the whole blending harmoniously and in pleasing contrast with the general darker tinting of the tiled floor.

In all its interior arrangements and appointments, the building is most admirably and completely adapted to its double purpose. In fact, the facilities possessed by this institution for the conduct of its practical courses and the imparting of high-grade and thorough instruction, and the systematic methods that it has evolved as the result of years of experience in teaching, are in themselves a revelation of typical American ingenuity and enterprise.

The administrative offices of the school are on the second floor; the remainder of the building is used for the accommodation of the large staff of instructors, editors, and other employes in charge of the various details of the work of the school. An interior telephone system that is unsurpassed for completeness connects all departments. To facilitate the work of the business office and mailing room, several of the latest electrical appliances have been installed, including adding machines, folding machines, and envelope sealers, all operated by electric power. In the basement are the stock room, the shipping room and the steam heating plant. The system of heating is known as the "direct-indirect:" the larger radiators are located in juxtaposition to cold-air ducts that lead from the outside through the walls and that supply an abundance of fresh air at all times. Electricity is used throughout for lighting purposes. The corridors and larger rooms are equipped with Nernst

lamps, the other parts of the building with incandescent lamps. Lavatories with hot and cold water are located on each floor.

On the second floor are the lecture room, and the rest room for employes. The lecture room is used as a meeting place for the clubs that have been formed at the Crane Company, the McCormick Harvester Company, and other large manufacturing plants in and near Chicago. At these plants students of the American school have organized, appointed leaders from their own number, and found mutual assistance in studying together. From time to time they meet in the lecture room of the school, where they are provided with instructors, apparatus, and—since most of them come direct from the shop to the school—with the substantial lunch, all for the usual tuition. The school also provides its employes with free coffee and lunch at noon time.

Suitable quarters and adequate equipment mean as much to the students of the school as they do to the persons who occupy the various offices. They assure speed and accuracy in the handling of the enormous mail of the school, and make possible the careful organization which is necessary to any school, resident or correspondence, that would make its work thorough and practical, and keep it up-to-date.

It is no small task to make a successful engineer out of the average student who enters a resident technical school, though he has the advantages of a good preliminary education, ample study time and personal instruction, the incentive of class competition, and the use of thousands of dollars' worth of apparatus. It is a tremendous task to make a successful engineer out of the man who was forced to quit school and earn his living, who works hard all the time and overtime half the time, who must study alone and at odd times, and who must be taught through books and letters, by men a thousand miles away. That the American School of Correspondence can produce successful engineers under such circumstances proves that its students are in earnest, its instructors are exceptionally capable, and its organization is perfect.

It is the purpose of the American School of Correspondence to take into every home the educational facilities offered by the best resident technical schools; to make it possible for every man, irrespective of age, occupation or condition, to educate himself at home during his spare time; to give the wage earner, the mechanic, the man who has "never had a chance," an opportunity to fit himself for the position in life which he desires to fill. For the furtherance of these noble purposes this splendid building was planned, and to them it is dedicated.

THE ALL-STEEL TELEPHONE.

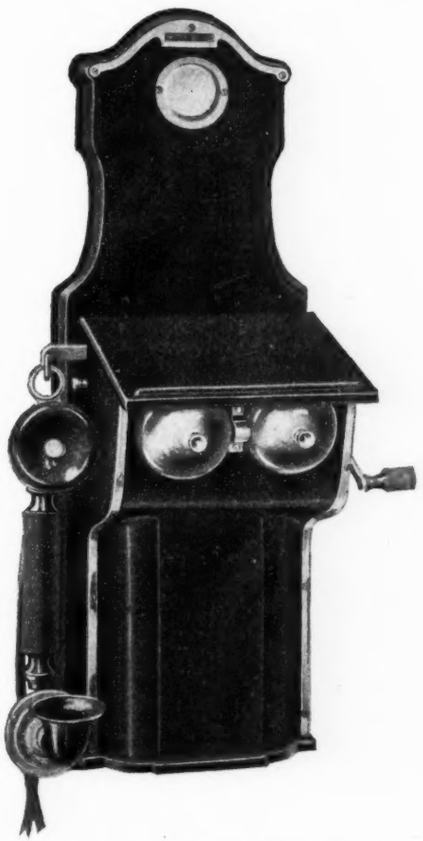
Very different from any telephone yet constructed is the "New Ericsson" all steel telephone. The manufacturers, the L. M. Ericsson Telephone Manufacturing Company, claim that it is finding great popularity among the exchanges indicated by the number of duplicate orders being received.

These telephones are made in three types for each magneto and common battery, all, however, being housed in one sized cabinet. The types consist of the standard or adjustable arm and receiver type, the handmicro type with hook switch and the cradle switch type, which is shown exposed in the cut below.

The magneto types are all made in series, 3-bar generator, 300-ohm ringer and in bridging, 4-bar generator, 1,000 and 1,600-ohm ringer, and 5-bar, 1,600 and 2,000-ohm ringer.

All equipment is standard and ample space is provided for two standard dry cells in the magneto type. The manufacturers claim that no telephone has heretofore been constructed so small and yet provides for this standard equipment and the space for dry cells. A diagram given in their booklet regarding these telephones gives the dimensions for comparison with others.

All cabinets being of uniform size allows the substitution of common battery equipment for the magneto when desired. This is a feature which is sure to prove of great advantage to the small exchange, which most often starts operations with a magneto system. The cabinets will withstand the kind of wear that means ruin to the older wooden type. A blow of fair proportions easily splits the wood, while in the case of steel no impression is made. Scratches do not show on the surface as on the wood, and in every way regarding wear the manufacturers claim absolute superiority.



Ericsson all steel telephone.

Booklet "B" will be sent on request.

BALLAST ON TOP AGAIN.

The Vote-Berger Company, manufacturers of the Ballast switchboard at La Crosse, Wisconsin, reports having just closed a contract with the Dwelle Telephone Company, of Lake City, Minnesota, for a complete Ballast common battery plant for that city. This new system is to replace magneto equipment now in use. The board will consist of a standard section of the multiple Ballast with 350 lines installed. The installation is to be made January 1, 1908, and includes complete central office equipment with power plant, storage batteries, main and intermediate distributing frames and switchboard protectors.

Before placing his contract with the Vote-Berger Company for a Ballast board, Mr. Dwelle, of the Dwelle Telephone Company, visited the Ballast system in operation at Grand Rapids, Wisconsin. Mr. Dwelle was so greatly impressed with the simplicity and the operation of the Ballast board that he was readily convinced that in the Ballast he was getting the most modern equipment offered upon the market today. The Grand Rapids system has been viewed and admired by telephone men from all over the country,

but the installation of the larger system at Lake City, with an improved type of telephone, will prove to be one of the most important and attractive telephone systems in the United States.

The Vote-Berger Company also reports among its recent deals the sale of magneto switchboards to the following companies:

One 300-line, Farmers' & Merchants' Mutual Telephone Company, Le Sueur, Minnesota; one 300-line, Chippewa Valley Telephone Company, Ladysmith, Wisconsin; one 300-line, Durand Light & Power Company, Durand, Wisconsin; one 100-line, Northfield Farmers' Telephone Company, Northfield, Wisconsin; two 150-lines, Ettrick Telephone Company, Ettrick, Wisconsin; Ettrick Telephone Company, Galesville, Wisconsin; one 100-line, Hamilton Home Telephone Company, Hamilton, Ohio; two 150-lines, Social Telephone Company, Amherst, South Dakota—one of these boards for Britton and the other for Cogswell; two 200-lines, Queen City Telephone Company, Ryder, North Dakota—one of these boards for Ryder, N. D., and the other for Plaza, N. D.

BLACK ENAMELED WIRE.

The American Electric Fuse Company has been experimenting with black enameled wire for several years and now is in shape to take orders and execute them promptly. The company states that "black enameled wire takes the place of silk and cotton covered. The coating or enamel is tough, elastic and will stretch with the wire, is easy to

handle and is less liable to damage than silk. Its diameter is one-third that of silk, but still gives the same insulation. It can readily be seen that with a little heavier enamel this wire will run in insulation far above silk. The wire will stand three times as much heat as silk or cotton covered. Take a piece of No. 32 cotton covered, and on a short circuit the insulation will burn at about two and one-half amperes. Put in a piece of black enameled wire and it will carry nearly six amperes or until the wire burns up. It takes up less room and does not absorb moisture."

"For instance, in the care of a ringer wound with black enameled wire—lightning of low potential comes in on the line. This current we can assume would char silk covered wire. With black enameled wire it would not affect the wire. The wire cannot carbonize as does silk, so here is made a saving of time, trouble and money—fewer ringers and induction coils to rewind and replace"

The American Electric Fuse Company has a large force now at work turning out black enameled wire. Special machines were built by the fuse company after long experiments to insure a perfect product. These machines are run twenty-four hours a day to insure the best wire possible. The company would be glad to give further information and prices on request.

IRONITE.

The Durant Electric Supplies Company is calling attention to the fact that the price of its Ironite duplex drop wire does not vary and that exchanges contemplating the use of a drop wire can always figure on a standard, stationary price if Ironite is specified. They also state that it is very much more economical than copper, costing twenty-five per cent less, even at the present low price of copper; that the tensile strength is very much greater, No. 18 Ironite being stronger than No. 14 copper. Ironite will never break inside the insulation and will not sag or stretch. Every trouble man knows how difficult it is to locate a break inside the insulation and stop the trouble. The decrease in the diameter of the wire decreases its weight and the consequent strain. Snow and sleet storms can never break down Ironite.

Its flexibility is remarkable and is fully as great as that of hard drawn copper. It has the added advantage of freedom from breaking when twisted or kinked and the conductivity is much higher than that of the fine wire (Nos. 19-22) used in a cable. Ironite will certainly offer no impedance to a circuit brought over a considerable length of cable, nor to one brought in over several miles of iron wire.

The insulation of Ironite is unequaled—only a high grade of rubber is used; the braid is very tight and of a superior quality of cotton, the whole being saturated with the most perfect weather proofing compound. Actual tests by telephone companies have shown an insulation resistance of 400 megohms per mile, after an immersion of forty-eight hours and after connection with 130 volt current. Every foot of Ironite is made in accordance with the most rigid specifications.

THE NEW TYPE OF MAGNETO.

The accompanying illustrations represent a new type of magneto telephone recently perfected and offered to the trade by the Swedish-American Telephone Company. This new instrument has been christened the "Economist." Figure 1 shows the instrument closed. In size this telephone is a trifle larger than the ordinary common battery telephone. The depth from back of telephone to tip of mouthpiece is less than the regular type of compact magneto telephone. The width is the same as that of the ordinary compact type. The "Economist" is furnished in either 3-bar series, 4 or 5-bar bridging, with or without condenser, with or without push button device for non-interfering service, 3-bar selective or for any class of magneto service that may be desired. Where economy of space and artistic appearance are desired, coupled with a perfect telephone in every respect, this instrument will be appreciated.

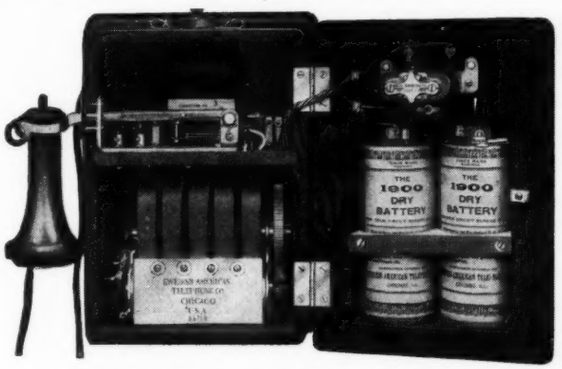
Figure 2 shows an open view of this telephone equipped

Figure 1—Swedish-American Economist telephone.

with two regular sized dry batteries. This instrument, it is said, is the smallest, neatest and most artistic magneto telephone yet designed and is an instrument that is bound to jump into instant popularity and general use. The design is correct, the size is just right and the workmanship and finish are superb; all cabinets are made of quarter-sawed

oak with piano finish. The Swedish-American company is prepared to make prompt delivery of any number of these instruments made up and wired for such service that will best suit individual requirements. Complete descriptive matter, specifications and prices will be sent on receipt of request.

The Swedish-American company wishes to announce that it will have a complete and comprehensive display of its product at the coming Electrical Show which will be held at the Coliseum, Chicago, January 13 to 26, 1908. The company is authority for the statement that it is in daily receipt of advices from many customers and friends saying they will be in attendance during the telephone convention which will be held in connection with the Electrical Show, January 21, 22 and 23. Telephone men generally are familiar with the up-to-date and thorough manner in which the Swedish-American company displays its popular products.



Swedish-American Economist telephone open.

SUMTER COMPANY'S SUCCESS.

A recent issue of "The State," the leading daily of Columbia, S. C., contained an article descriptive of the growth of the Sumter Telephone Manufacturing Company, of Sumter, S. C., and the large patronage enjoyed by that concern. Extracts from the article follow:

"The Sumter Telephone Manufacturing Company has just finished up a large order from the United States government for telephones for the army corps now stationed in Cuba. This company also has orders from the United States government for a great many telephones to be shipped to different parts of this country. Another order for telephones and equipment is being filled for a central American city, which order includes a number of the Sumter concern's famous 'unitype' switchboards and all of the paraphernalia essential to a complete equipment of telephone exchanges. Several orders are also being manufactured for Canadian points.

"Although the floor space occupied by the Sumter Telephone Company is now fully 400,000 square feet, nevertheless, it is necessary, owing to the great demand for Sumter telephones, switchboards, etc., to add another large building, to be used exclusively as a wood-working plant. Practically all of the Independent telephone exchanges in the south are equipped with telephones, switchboards and supplies made by the Sumter factory. The superiority of the Sumter telephones and switchboards has been acknowledged by several foreign and American expositions, and perhaps the best proof of their superiority lies in the number of orders received from the United States and foreign governments.

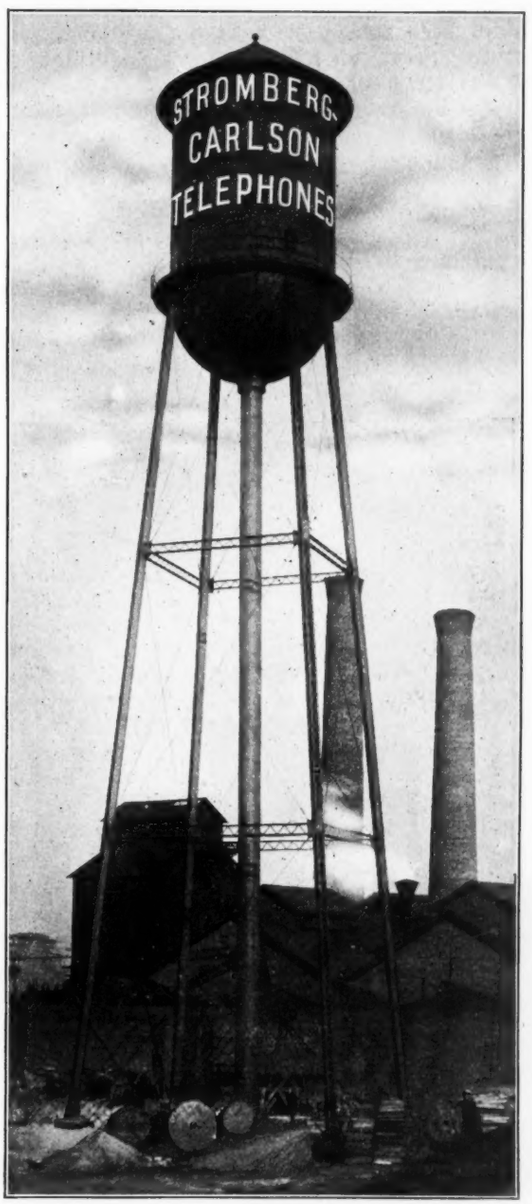
"The raw material, logs, brass, iron, steel, iron, wire, copper and all material necessary go in at one end of the factory and come out in the finished state at the other end. Thousands of dollars worth of the most up to date machinery for the manufacture of all parts of a telephone or switchboard are in the factory, many of the machines being made specially to the order of this company. Hundreds of men, boys and girls are employed and the business is rapidly growing. The patents on many of the machines used in making the intricate parts of telephones and switchboards are owned by the local company.

"In an agricultural district, remote from the iron, brass, copper and metal mines and jobbing centers, the Sumter telephone factory is a big exhibition of what inventive ingenuity and good business management can do towards diversified manufacturing in this section of the South."

HIGHER ADVERTISING.

H. C. Alemin, advertising manager for the Stromberg-Carlson Telephone Manufacturing Company, pertinently says: "A good sign needs but few words, but they must be to the point."

Advertising signs are seen in as many different forms as places—every factory, every office, every shop, and even vehicles belonging to different houses, display a sign of some sort to attract the public's attention either to a particular product or the company in business.



A high sign and a good one.

The accompanying illustration shows the unique manner in which the Stromberg-Carlson Telephone Manufacturing Company has utilized blank space in the air for advertising

the company and its product. The sign has just been painted on two sides of the water tank that can be seen from the busiest thoroughfares of Rochester and the New York Central railroad.

The tank, which is twenty-two feet in diameter, holds a reserve supply of 100,000 gallons of water for operating the Grinnell sprinkler system installed in the four buildings of the Rochester factory. The distance from the ground line of the four supports, which are thirty-three feet apart, to the bottom of the bowl-shaped side of the tank, is just 100 feet, and the distance to the top of the cone 148 feet. The buildings and two smokestacks shown in the background constitute the power plant of the Stromberg-Carlson Telephone Manufacturing Company.

CRACRAFT-LEICH ELECTRIC CO.

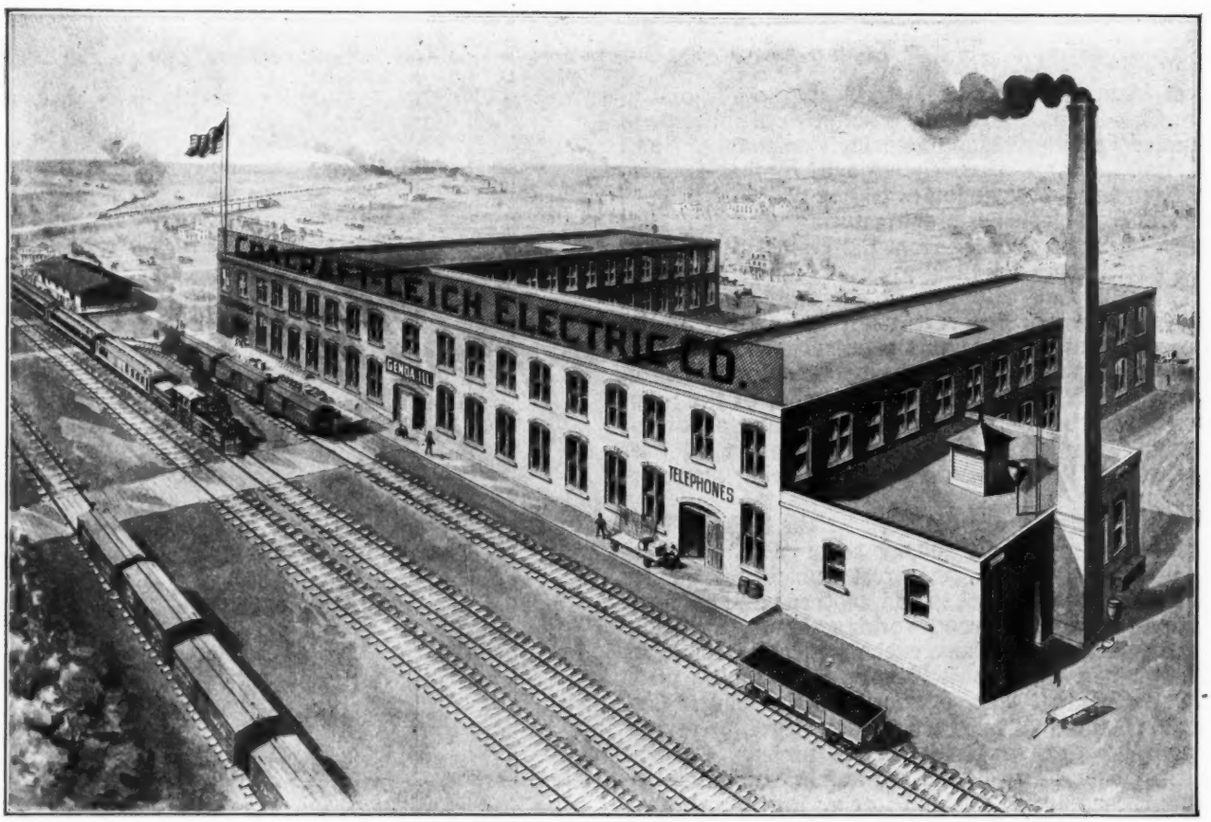
Strong New Company Succeeds the Eureka Electric Company, of Genoa, Illinois.

DURING the last few months some important changes have been taking place in the telephone manufacturing field. One of the most important of these changes was the purchase of the entire plant, equipment, machinery and all other assets of the Eureka Electric Company, of Genoa, Illinois, by the Cracraft-Leich Electric Company. Immediately after all the details of the transfer of the property were consummated, the new company set to work perfecting the apparatus, and largely changing the method of manufacturing piece parts so as to have them come accurately sized from the machines, and, in fact, everything to produce a class of telephone apparatus of a quality excelled by none.

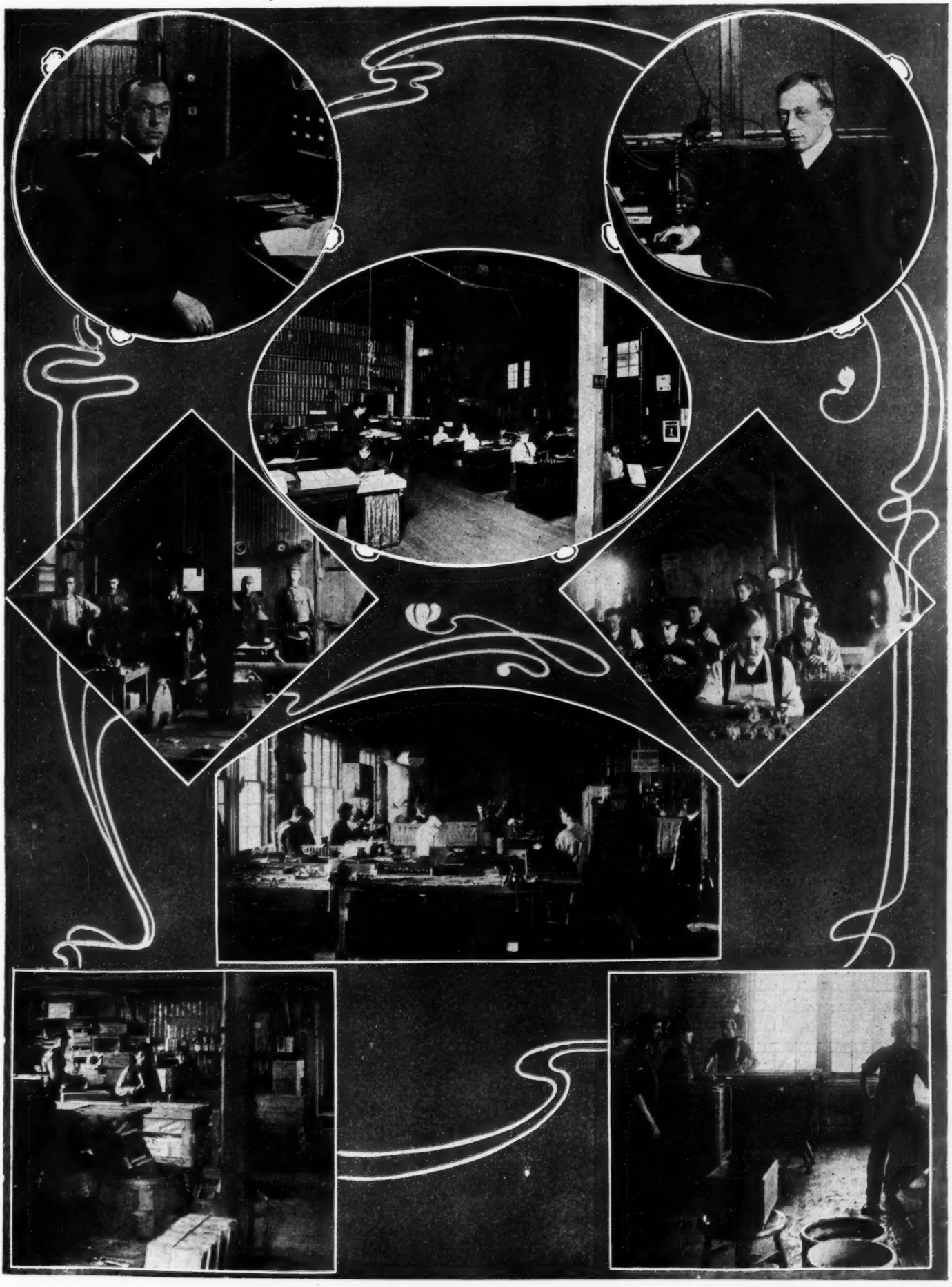
With "Quality" as its motto, the Cracraft-Leich Electric Company is entering the field with telephone apparatus in which its officers have full confidence, and the heads of the new company feel that the apparatus sold as Cracraft-Leich telephone apparatus, and which is conscientiously placed in the market, will go as surety for their success.

The organization of the Cracraft-Leich Electric Company is such that the heads of the different departments hold their positions only because of their ability and fitness for the same, thereby avoiding apparatus of improper design and quality being shipped out of the factory, which often is done simply to satisfy those not thoroughly familiar with telephone necessities and requirements. This has a particular bearing on the design of the apparatus.

Messrs. Cracraft and Leich need no introduction to the readers of TELEPHONY, but it may be well to state here their former connection with the telephone business. John P. Cracraft, who is president and general manager of the new organization, is known throughout, and has a thorough knowledge of the entire telephone field, having been for the past thirteen years with the two largest telephone manufacturing companies in the world. For nine years he was with the Western Electric Company, going from the shop to the engineering department and then becoming chief installer and later branch house manager. For four years Mr. Cracraft was with the Stromberg-Carlson Telephone Manufacturing Company as western manager in charge of the Chicago office and factory, and in addition thereto, he was for the year previous to the organization of the Cra-



Factory of the Cracraft-Leich Electric Company, Genoa, Illinois.



J. P. Cracraft, Oscar M. Leich, and general office and factory views of the Cracraft-Leich Electric Company, Genoa, Illinois.

N. Pedersen.

Alex. Reid.

F. G. Hudson.

J. H. Wagoner.

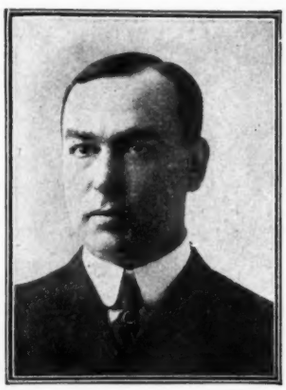
A. R. Kahl.

V. Meyers.

craft-Leich Electric Co. general sales manager for that company.

Oscar M. Leich, secretary and chief engineer, is well known in the telephone field for his knowledge of operating conditions, and his ability to design efficient equipment to meet all conditions and requirements. He was for three years in the experimental and engineering department of the Western Electric Company. Afterward he was for two years engineer and sales engineer for the American Electric Telephone Co. For four years he was in the engineering department of the Stromberg-Carlson Telephone Manufacturing Company, where, previous to the organization of the Cracraft-Leich Electric Company, he was the chief engineer.

To complete their organization these gentlemen have with them as heads of the different departments such well known men as N. Pedersen, superintendent; Alexander Reid, at the head of the electrical laboratory and drafting department; F. G. Hudson, at the head of the credit department; J. H. Wagoner, as purchasing agent, and A. R. Kahl, as sales engineer.


John P. Cracraft.

Oscar M. Leich.

All of these men have had wide experience, and up to a short time ago were connected with the Stromberg-Carlson Telephone Manufacturing Company. The Cracraft-Leich Company has been fortunate in being able to retain such men as W. M. Adams, F. H. Holroyd, C. L. Nelson, V. Meyers and J. Balck, formerly with the Eureka Electric Company, in charge of various departments. The new organization has also been fortunate in retaining E. L. Larabee, who has charge of the western branch, at Beatrice, Nebraska, and J. H. Bell as the Indiana representative. Mr. Larabee and Mr. Bell are well pleased with the increased business they are able to do for the new company.

The building of the Cracraft-Leich Electric Company is a very creditable and imposing structure, having been built expressly for telephone manufacturing purposes and is practically new. It enjoys the best advantages, as regards light, ventilation and convenient arrangements, and has facilities for making a complete line of apparatus from the raw material with the exception of some cabinet work.

The Cracraft-Leich Electric Company's plant is situated at Genoa, Illinois, but a short distance out of Chicago, near the outer freight belt line, to which all Chicago incoming and outgoing freight is sent for distribution to the proper roads, and, in addition, is on the main line of the Chicago, Milwaukee & St. Paul and Illinois Central railroads, giving it direct shipping facilities to all sections of the country. This makes the shipping facilities even more satisfactory than could be had if the factory were located inside the city limits of Chicago. Genoa being only one and one-half hours' ride out of Chicago gives the new concern all the facilities of the metropolis by being able to obtain experienced help.

Genoa enjoys a good Independent telephone system, having Independent long-distance toll lines, the connections covering Illinois, Iowa, Wisconsin and other western states. Telephone men throughout this section of the country can, therefore, secure Independent telephone connections direct with the Cracraft-Leich Electric Company, which would be impossible if the concern were in the city of Chicago.

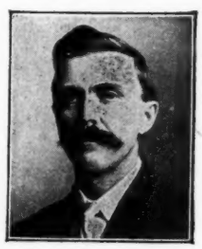
Messrs. Cracraft and Leich have studied the situation carefully and find that the Independent field is growing stronger and stronger every year, and that the class of telephone apparatus now demanded by the telephone operating companies is of a higher grade than that produced three or four years ago. The new company is therefore exerting all its efforts to perfect and put on the market telephone apparatus of the highest grade and quality only, and will do everything in its power to satisfy the purchaser, and hopes to meet with universal favor by the telephone trade. The field generally will welcome the new concern and wish it all manner of success.

W. M. Adams.

F. H. Holroyd.

C. L. Nelson.

J. Black.


E. L. Larabee.

J. H. Bell.

Some Interior views of the Cracraft-Leich Electric Company's plant, Genoa, Illinois.

A NEW "FAULT-FINDER."

The extensive development in recent years of the telephone industry has necessitated a parallel development of numerous classes of apparatus and industries subservient to the growing needs of the telephone companies. The hiding underground of large quantities of wires in lead encased cables has necessitated the invention of simplified forms of accurate, fault-locating apparatus.

The lines of cables are installed and cared for as a rule by men having little leisure or opportunity for education in the schools where the manipulation of algebraic symbols is taught. These are the men, however, who must promptly and accurately "spot" the numberless troubles which occur in underground cables, and they must do this with a minimum of cost to the telephone companies, meaning also the least possible interference or delay in the telephone service.

New Leeds & Northrup faultfinder.

To meet the increasing demand for apparatus, to be placed in the hands of men who have to locate trouble, many devices have been invented, manufactured, and highly extolled in advertisements. Ever increasing experience has shown that what is uncertain and complicated must be discarded as unsuitable for this class of work in hand. A "fault-finder" which will tell where the wire is open, grounded or crossed with another wire, in order to be useful, must be simple, as well as accurate and reliable.

The Leeds & Northrup Company, of Philadelphia, which has long been engaged in the manufacture of fault locating apparatus, has, with the advice of many practical wire-chiefs and skilled telephone engineers, developed a "fault-finder," which, it is claimed, fills all practical requirements as to reliability, simplicity, speed and accuracy in a unique manner.

The appearance of the apparatus is well shown in the illustration herewith. The size of the box, complete with the contained battery is 6½ x 8 x 10, and weighs 10½ pounds. While the circular slide in the illustration might suggest a contact, moving over a delicate and easily broken slide wire, this is not the construction used. A new method on which the Leeds & Northrup Company holds United States patents enables a uniform variable slide resistance to be gotten in practically infinitesimal steps, it is said, and to have a resistance of not less than 100 ohms, while being at the same time so substantial as to endure indefinite usage.

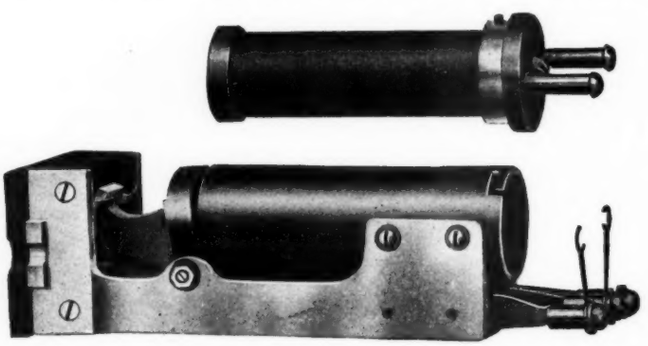
In the cover of the apparatus is contained in non-technical, simply expressed language and clear diagram, instructions for making the many kinds of tests to which this apparatus is adapted. By connecting the faulty and good wires and ground to the binding posts, and setting the three switches as directed, anyone, without previous experience, may locate the great majority of faults and "opens," such as occur in telephone cables.

The directions give an arrangement by which the resistance of the conductor loop can be directly measured with accuracy, and four methods are also given by which faults may be located, these faults being either grounds or crosses between the wires. Generally, these methods may be used in succession for the same faults, thereby checking each other. The directions show how, by connecting to the posts a telephone and a small buzzer, the distance from the station to the point where a wire is broken, may be located with simplicity and accuracy. The same apparatus can be used by a new method to measure high resistances, such as the resistance of faults. The set contains its own batteries, but can be used with outside battery not exceeding 110 volts. When such an outside battery is used, resistance of several megohms may be measured.

The simplicity of the apparatus, together with the clearness and fullness of the directions for using it, make it adaptable for the immediate use of unschooled persons who have to work on cables. Messrs. Leeds & Northrup announce that this "fault-finder" is essentially intended to save money. The saving consists in being able to avoid unnecessary and expensive cutting of cables, and the employment of wire-chiefs or other skilled labor to discover the location of the trouble. The mechanical construction, quality of the material used, and finish given to this "fault-finder" is that of high grade instruments.

THE LATEST AUTOMATIC RESTORING DROP.

The Western Telephone Manufacturing Company is just introducing to the trade its new type "F" automatic restoring, target signal, removable coil, combined drop and jack. The coil of this drop, as will be seen by the accompanying illustration, can be removed from the drop by loosening two screws, and these screws can be reached from the back of the board without disarranging any of the wiring or other equipment. This makes it possible to remove the coil and replace it with another one just as quickly as two screws can be loosened, one coil taken out, and the other placed in the drop. The night bell circuits in this drop are perfect, the contact being made by the weighted armature and scraping contact points. This insures a positive night bell circuit.



New Type F Western drop and jack.

The jack is made of extra heavy German silver springs which are very long, guaranteeing efficiency and wear. The jack is constructed of four springs, if desired, so that the coil can be cut off both sides of the line. The drop is assembled on heavy frames which make it rigid and strong.

Some Interior views of the Cracraft-Leich Electric Company's plant, Genoa, Illinois.

Anyone familiar with telephone apparatus cannot help but see the advantages and good points in this drop if he gives it a close examination. The company's offices are located at 50 West Jackson boulevard, Chicago, and it would be pleased to have exchange managers write for samples if they contemplate installing a local battery or magneto board.

AN INTERESTING VOLUME.

The American School of Correspondence, Chicago, has published an unusually interesting and valuable book on "The Electric Telegraph," the authors of which are Charles Thom, chief of the quadruplex department of the Western Union Telegraph Company, and A. Frederick Collins, author of "Wireless Telegraphy, Its History, Theory and Practice." The book is handsomely illustrated and contains two parts, No. 1 being on the telegraph and No. 2 on wireless telegraphy. The work constitutes a manual of complete instruction in the principles, mechanism and practice of the art of sending and receiving telegraphic messages, including multiplex and wireless systems of transmission.

GRAY PAY STATION BULLETIN.

The Gray Pay Station Telephone Company, of Hartford, Connecticut, has a new bulletin ready for distribution to

Gray pay station No. 18.

telephone buyers. The new bulletin illustrates and describes a number of the company's most popular types of apparatus, including the Independent or "Shield" pay station.

Single slot pay station.

In this connection the Gray Telephone Pay Station Company calls attention to the three following claims which may be of interest: First, the Gray Telephone Pay Station Company is the pioneer in the manufacture of toll equipment and the largest concern devoted exclusively to pay

Shield pay station.

stations in the world; second, there are over 160,000 pieces of Gray apparatus in use; third, and "last, but not least," back of each piece of apparatus that this company makes, there is nineteen years of experience—an item of significance to be considered by prospective purchasers.

STROMBERG-CARLSON TRADE MARK.

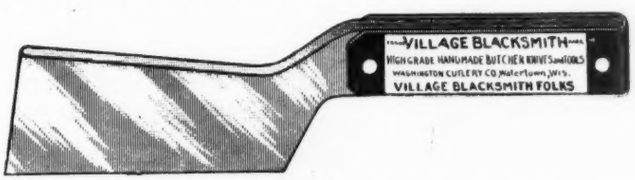
The Stromberg-Carlson Telephone Manufacturing Company Rochester, New York, and Chicago, Illinois, filed an application for registration of a trade mark for certain electrical instruments in the United States Patent Office, May 22, 1905. In accordance with the trade mark laws, the commissioner of patents has issued patent No. 66,210, under date of November 12, 1907, officially creating Stromberg-

Carlson a trade mark, which has been in actual and exclusive use as a trade mark of the applicant and its predecessors, from whom it derived the title, since July 1, 1894. This trade mark name, which is well known among the telephone fraternity, has been made to indicate not only the character and quality of the business, but the personality of the house it represents.

The use of the above trade mark in advertising the products of the Stromberg-Carlson Telephone Manufacturing Company has been an important feature, and old customers and telephone people in general have learned to associate the "Central Energy" products with the manufacturers of the aforesaid name.

NEW CABLE CLIPPER.

The cable clipper illustrated herewith is made by the Village Blacksmith Folks at Watertown, Wisconsin, and is forged from the best grade of crucible steel and tempered in a manner that makes it very serviceable. The handle or grip is covered with leather, so as to overcome vibration,


VILLAGE BLACKSMITH
HIGH GRADE HANDMADE BUTCHER KNIVES and TOOLS
WASHINGTON CUTLERY CO. Watertown, Wis.
VILLAGE BLACKSMITH FOLKS

and is made with an offset, that has been found to be a great improvement over the ordinary tool and appreciated by all cable men. This tool is guaranteed to be superior in every way and worth two made of ordinary steel, and by usual methods. The Village Blacksmith Folks will be glad to send descriptive matter and attractive prices.

THE DULUTH LOG COMPANY

Something About an Enterprising Concern and the Men Who Manage It.

THE STEADY growth and great success of many of those companies managed by the young men of the present day, especially in the telephone field, are always interesting to trace. Prominent in this class is the

Trademark.

Duluth Log Company, of Duluth, Minn., which has made rapid advancement since its incorporation. This well known concern handles annually more than half a million tele-

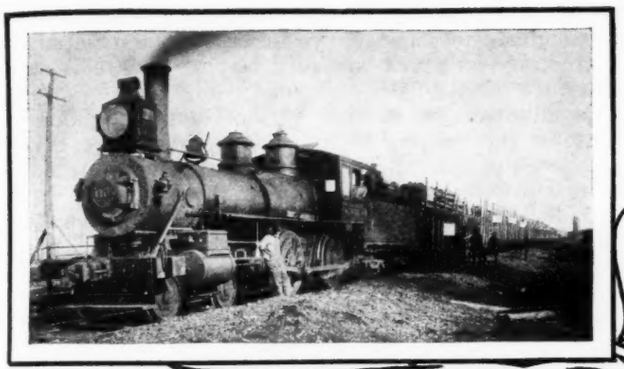
President's office.

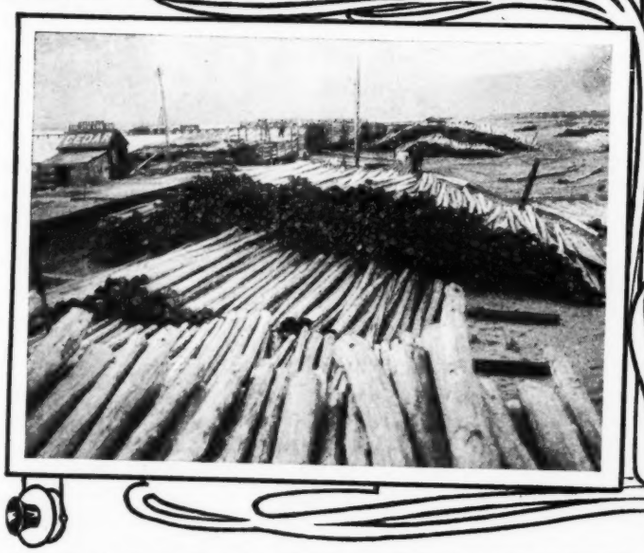
phone and telegraph poles, about two million pieces of shed and fence stock, about a million railway cross ties, large quantities of piling and other forest products, in addition to the large amount of lumber, lath and shingles produced at its various mills.

The Duluth Log Company's specialty, however, is catering to the telephone trade, for which it is very well equipped in the handling of rush orders, and on account of the advantageous location of the various yards is in a position

T. P. Bradley, secretary and general manager.

A Duluth Log Company spur track up in the woods.





Above illustrations show train load of cedar poles and northwest corner of Duluth Yard No. 2.

to give to its customers the benefit of the lowest possible freight rates.

The company maintains at Duluth two large yards, containing about three miles of trackage, which adjoin the railroad terminals at that point, and the excellent switching facilities make it possible to secure cars at one hour's notice. At this point the company is not hindered by congestion of traffic, which condition is so generally found in the larger cities, the railroad terminals at Duluth being so extensive that cars under load, when switched out of the yards during the day, are nearly always made up into trains leaving Duluth that night, instead of being held in railway yards for days and weeks at a time.

The Hawthorne, Wis., yards of the Duluth Log Company and the mill, where is carried an unusually large stock—the business at this point also being supported by a large general store—is located twenty-seven miles south of Duluth, on the line of the Chicago, St. Paul, Minneapolis & Omaha railway. This yard acts as a concentrating point for heavy operations by the company along this line of road and its connections in northern Wisconsin. The Duluth Log Company also has a large and well equipped yard at Washburn, Wis., located on both the Chicago, St. Paul, Minneapolis & Omaha and the Northern Pacific railways, which takes care of operations in Bayfield county, stock being received both by rail and water.

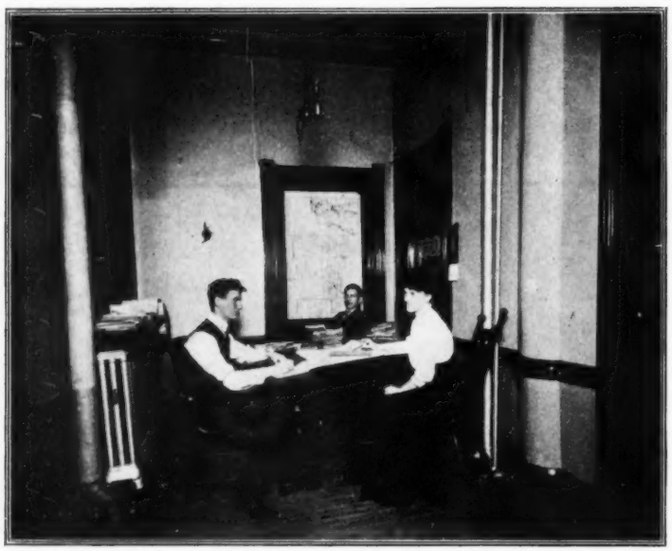
At Aitkin, Minn., the company has a saw mill and cedar yards, this point being located on the Mississippi river, with two miles of track, rail connection being had with the Northern Pacific railway. There are concentrated in these yards all the operations tributary to this line of road between Duluth and Brainerd, besides the output of the camps on the Mississippi river and its many tributaries. There is probably more cedar produced on the Minnesota & International railroad than along the lines of any other two railways in the country. Upon this one road the Duluth Log Company maintains five cedar yards—at Laporte, Northome, Durrins Spur, Duluth Spur and Big Falls. From the Big Falls yard alone, which is located on the banks of the Big Fork river, the company is able to handle from 150,000 to 200,000 poles annually. This yard taps from 400 to 500 miles of river running through virgin forest, and which is considered the best cedar section left in the country today. The company has enough standing cedar to last at the present rate of consumption, between fifteen and twenty years.

The Duluth Log Company was organized by E. L. Bradley in 1898 for the purpose of conducting a general forest product business. He is president and treasurer of this concern, and has been in the lumber business all his life, and, at the present time, in addition to his connection with

The illustrations below show scow load of cedar poles, east side of Duluth Yard No. 2 and trainload of short cedar.

the Duluth Log Company, his other timber and iron holdings, is extensively interested in the telephone business at the head of the lakes. In 1901, Thomas P. Bradley became connected with the corporation, and now occupies the position of secretary and general manager, although he is still, even today, a comparatively young man. The continued expansion and growth of the business have been due in no small measure to his remarkable ability and tireless energy.

The Duluth Log Company started operations on a heavy scale in the winter of 1902-3, and since that time its business has doubled each successive year, until at the present time its holdings and field of operations are so great that the concern ranks among the leading pole producers of the country. In the growth of the business it has been the policy of the company constantly to keep up to grade the stocks on hand at the several yards, and this condition has been responsible in a considerable degree for the continued expansion in the trade in the telephone field.



Traffic department.

Realizing the importance to the construction superintendent of having material delivered promptly after orders have been filled, a traffic department has been created, of which Virgil A. Anderson is manager. Upon this department devolves the duty of having equipment promptly set at the yards, from which orders are to be filled and, furthermore, in obtaining for the customers prompt movement of shipments to their destinations. It has not been unusual to load orders the same day and to have the delivery effected at the destination within one week. Being in close touch daily with the various yards, the very best of service has been secured for all customers, and as the above facts as to service are demonstrated repeatedly on trial orders, the company's prestige has been materially augmented, and a further increase in shipments is anticipated, as pole customers are convinced that the very best of service is secured from the yards of this company.

This rapid advancement made by the Duluth Log Company must be encouraging to the young and capable general manager, and TELEPHONY joins with his many friends in wishing him still greater success for the future.

Mr. Bradley is justly considered one of the most popular as well as up-to-date and efficient men in the trade, and his able discharge of the duties of his position has had much to do with the enviable record made by the Duluth Log Company.

THE NEW ERICSSON PUBLICATION.

The L. M. Ericsson Telephone Manufacturing Company, of Buffalo, N. Y., recently published a little booklet, which is being distributed throughout the telephone field. It deals exclusively with its all-steel telephone.

The drawings are entirely original and are all in Holland Dutch style. The cover presents a scene along one of the numerous canals of Holland and shows the characteristic features of that part of the country. Three colors are worked in to give a harmony and beauty, that is to say the least, very pleasing. The title page shows a little Dutch scene at the top, and the sides are worked in panels containing the Dutch tulip. The base panel contains the manufacturer's name.

The inside pages are worked up in the same treatment and present a very striking and pretty picture of a scene along the sea shore which is worked into two panels to contain the printed matter. In the whole book great originality is shown and worked up to the best of advantage. On the cover and center page the designs represent communication at distances as carried on before the era of telephones, namely, calling through the hands.

To anyone interested in a telephone the booklet, because it sets forth the "New Ericsson" all-steel telephones, is of great interest, and as a remarkable instance of originality and beauty, one finds here all that could be desired. It will be sent on a request to Department E.

APPROVES MERICO SOLDERING PASTE.

The Stromberg-Carlson Telephone Manufacturing Company, of Chicago, has written to the American Electric Fuse Company, of Muskegon, Michigan, manufacturers of Merico soldering paste, the new non-corrosive flux, the following letter:

CHICAGO, ILL., Nov. 20, 1907.

American Electric Fuse Co., Muskegon, Mich.

Gentlemen: Referring to your sample of Merico soldering paste, which you forwarded to us, wish to state that we have had the sample tested out and find it to be perfectly satisfactory.

Yours very truly,

STROMBERG CARLSON TELEPHONE MANUFACTURING COMPANY.

The Merico is winning favor steadily, as the above commendation proves.

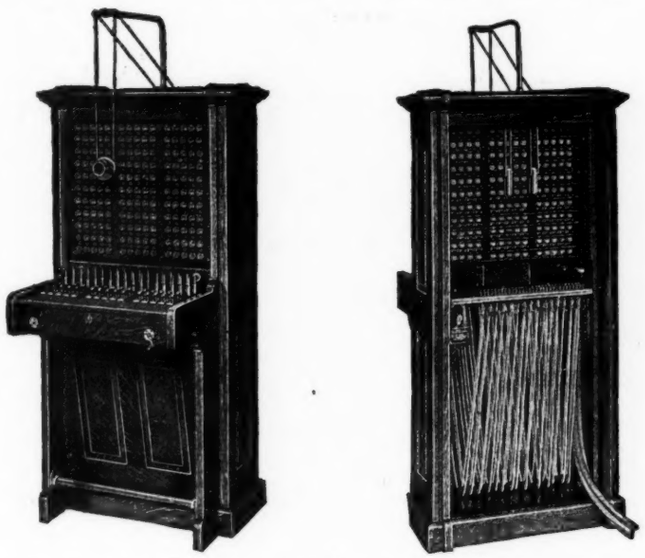
Accounting department.

General manager's office.

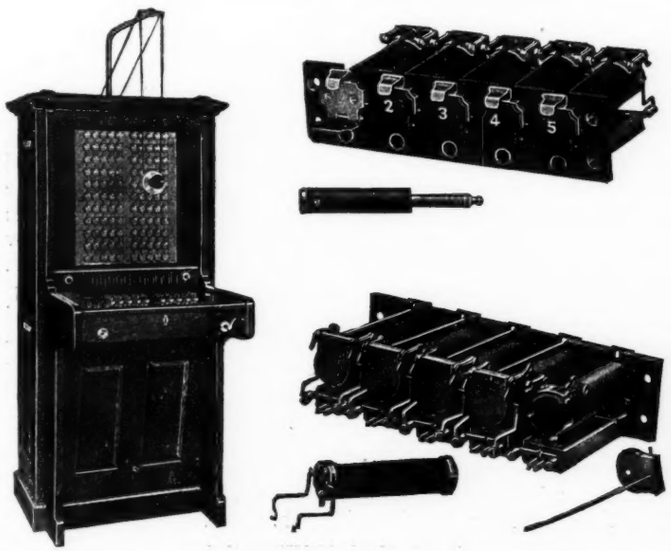
Billing department.

A NEW MAGNETO CALL SWITCHBOARD.

In this new switchboard, made by the Century Telephone Construction Company, of Buffalo, are included some entirely new features which are said to increase the efficiency of magneto telephone service while decreasing the maintenance cost. The line equipment includes self-restoring drop signals of the removable coil type mounted in combination with the line jacks in strips of five each. The switch-



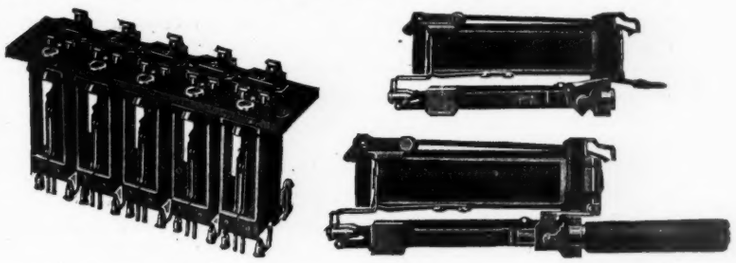
board can be equipped with either series or bridging drops, the bridging signals being also made for use with telephones equipped with push buttons. The regular cord circuits include bridged, clearing-out drops of the same general construction as the line drops. Where an exceptionally efficient clearing-out signal is desired the manufacturers can equip the cord circuits with duplicate clearing-out drops,



there being one used with each cord. These signals can only be operated over the cord to which they are connected. It is impossible to ring past either signal, and, further, the signal is said to be perfectly reliable even when the cords are connected to series or exceptionally heavily-loaded, bridging lines. This signal overcomes entirely the ringing in a subscriber's ear or the recalling of a subscriber when ringing off.

The circuit, including the double clearing-out signal, is exceedingly simple and is fully as efficient for voice transmission as the ordinary cord circuit with single clearing-out signal. With the double clearing-out signal, the operator is at once aware of both parities being through, which makes it unnecessary for her to listen on the line for this purpose. Each regular cord circuit also includes listening key and ringing key for ringing on both cords. When necessary, repeating coil and key for cutting same in or out can be included.

The operator's equipment includes a suspended transmitter of the "platinum electrode" type, a lightweight, adjustable head receiver with leather-covered head band. The receiver terminates in a plug and cord, the cord being re-enforced at the plug end and covered with silk braid. An operator's jack is provided, including transmitter battery cut-off springs. An induction coil, carefully designed to give the highest efficiency with the transmitter and receiver

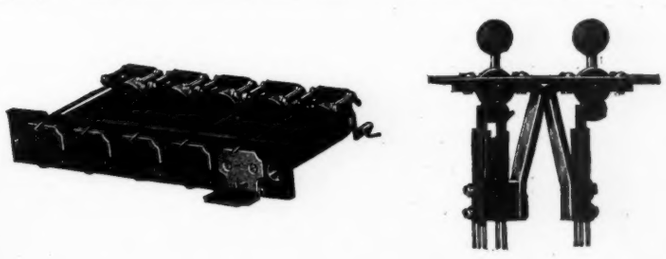


used, is also included. Three cells of Schoenmehl primary batteries are included for the operation of the transmitter.

The ringing equipment includes a powerful five-bar hand generator provided with Tungsten steel magnets and laminated soft iron armature wound with silk-covered wire. A switch is included for cutting in an auxiliary ringing machine. This switch is mounted on the face of the switchboard, convenient to the operator.

The night bell circuit includes a round pattern vibrating bell, two cells of Columbia dry batteries and a switch for cutting the bell in or out of circuit. The switch is mounted on the face of the cabinet within reach of the operator.

All of the wiring in the switchboard is done with silk and cotton insulated tinned copper wire, formed up and laced into cables of the proper size. All cables are thoroughly boiled in beeswax to exclude moisture. All connections are carefully made and soldered without the use of acids, salts or paste. The line cable wires are colored in accordance with a pre-determined code to facilitate the proper location of the different circuits. This cable is of



sufficient length to extend ten feet from the base of the cabinet.

The cabinet is carefully constructed of well-seasoned, quarter-sawed oak, finished in golden oak and highly polished. The back of the cabinet, also of oak, is paneled and made removable. The front panel below the key table is also removable. The key table is made three-ply and hinged to the plug shelf, the key table also being provided with spring lock. The plug shelf and the panel immediately below the clearing-out drops are covered with oak-tanned leather, finished to match the cabinet. The cabinet is made in units of one position each, the end panels being separate so that any number of sections can be combined and still retain the appearance of a complete unit. Suit-

able division panels are provided between sections where more than two positions are included in the switchboard.

The line drops are of the tubular type, mounted so as to appear immediately above their corresponding jacks, the drops and jacks being mounted on strips of five each. The drop shutter is automatically restored upon inserting the plug into the jack, the signal being completely restored before the plug makes contact with the jack springs. The restoring device is exceedingly simple, including only a short sleeve pivoted across the path of the plug immediately in front of the jack springs. To this sleeve is pivoted a pin normally resting behind the lower edge of the drop shutter, the shutter when in a calling position being in the direct path of this pin. The plug, upon entering the jack, causes the pivoted sleeve to assume a horizontal position, thereby pushing the pin forward, causing the shutter to be restored to its normal position. The drop coils are wound directly on the core, the winding being carefully insulated therefrom. The coil winding terminates in German silver connectors attached to the head of the spool. These connectors are forked on the one end and engage screw connections on the jack springs. The coils can be removed within a few seconds' time by disconnecting from the jack, removing the armature by lifting the latches on the armature bracket, and then withdrawing the coil. A small catch is provided on the coil, so that the same is securely held in the proper place in its shell. The jacks are self-contained and include tip and sleeve springs, the sleeve of the jack forming no part of the circuit. The springs are insulated from each other with hard rubber and are provided with platinum contacts. Each drop includes perfectly reliable night bell contacts.

The clearing-out drops are constructed in a similar manner to the line drops, but are not self-restoring. They are so mounted as to appear immediately behind their corresponding cords. Where double clearing-out signals are included, the drops of each cord are mounted one above the other. The ringing and listening keys are mounted in combination on one face-plate and so arranged that all parts are easily accessible. The frame of the key is made of brass and is finished in nickel, the face-plate being highly polished. The key springs are made of German silver and provided with platinum contacts. All springs are carefully insulated from each other with hard rubber.

VISUAL SIGNAL SWITCHBOARDS.

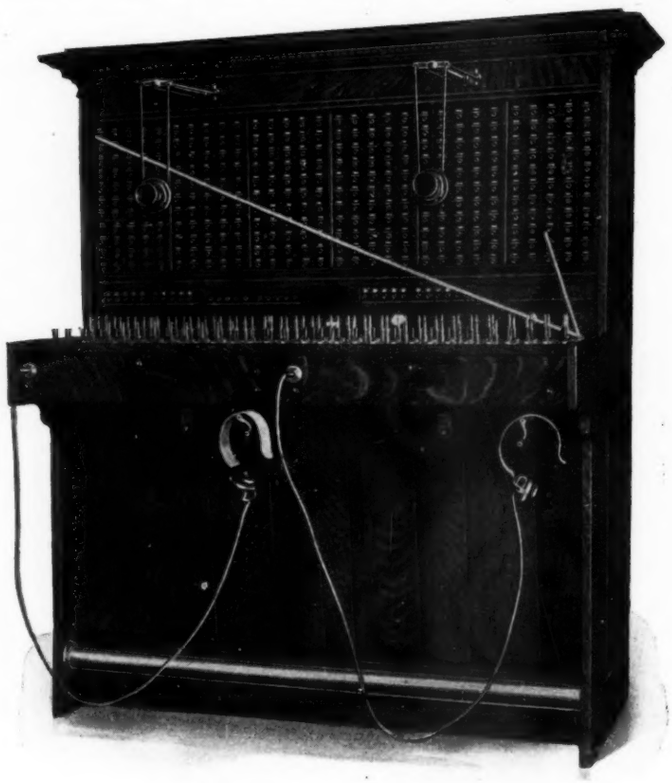
The Western Telephone Manufacturing Company reports a marked demand and a decided increase in sales for its visual signal type of magneto switchboard. The Western was one of the first mechanically self-restoring drops to be put into successful commercial operation. Not satisfied with this achievement, although at that time it was a considerable step in advance, this pioneer company at a great experimental cost perfected and introduced the visual or target signal.

This new drop carried with it all of the desirable features of the older, shutter type, self-restoring drop and its mechanical construction has been so perfected that it is claimed to be the simplest yet offered to the trade. It is the Western's exclusive design.

Every exchange manager knows that mechanical simplicity of equipment means low cost of maintenance which means increased dividends to stockholders. If managers would bear this in mind when purchasing exchange equipment a great deal of unnecessary expense would be eliminated, as the installation of complex apparatus means added cost of maintenance sooner or later.

The cut illustrates a new type, two-position, magneto call switchboard recently manufactured by the Western Telephone Manufacturing Company. Three hundred type F, separate unit, automatic restoring, visual signal drops are installed. It presents a pleasing appearance and its operation is said by the company to be highly indorsed by leading telephone engineers.

The Western Telephone Manufacturing Company has always maintained a high standard and devoted itself to the purpose of bringing the best and most modern equipment to Independent operators. It prides itself upon its consistent policy of supplying the best grade of goods only and of keeping abreast of the times.



Western visual signal switchboard.

CENTURY COMPANY'S NEW BOOK.

The Century Telephone Construction Company, Buffalo, N. Y., has published an attractive and useful book entitled "The Rural Telephone." The book contains much valuable information on the advantages of telephone service, when and how to begin the work of organizing a company, how to organize, method of incorporation, forms of by-laws, contracts, etc. General descriptions of pole line construction, installation of switchboard, selection of equipment and other important topics are subjects of other interesting chapters in the Century's instructive book, which is sure to be of value to parties contemplating the construction of a rural telephone system.

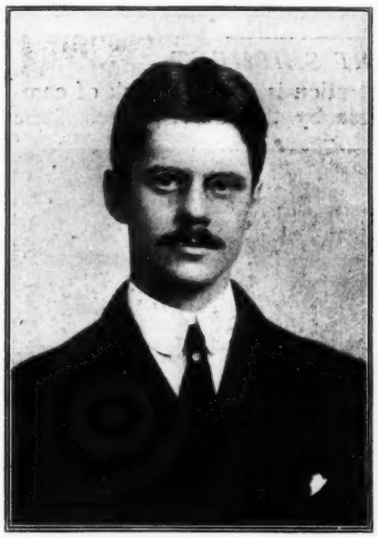
The Century Telephone Construction Company maintains an inquiry department which will answer all questions regarding telephone apparatus and exchange management. The new book is a credit to its publishers.

HUBBARD & COMPANY STILL GROWING.

Hubbard & Company of Pittsburg, Pa., is building additions to its already large establishment which will increase its capacity threefold. This will enable the firm to not only meet promptly the large demand for its present line of construction materials, but to extend same in several important directions. All of the new additions are steel and concrete throughout making them thoroughly fireproof. Hubbard & Company recently has opened a western branch at 417 Fisher Building, Chicago, which is in charge of G. W. Aishton.

VOTE-BERGER'S NEW ENGINEER.

J. N. Wallace, one of the most prominent engineers ever in the employ of the Western Electric Company of Chicago, Illinois, has severed his connection with that company, and accepted the position of assistant chief engineer with the Vote-Berger Company at La Crosse, Wisconsin. Mr. Wallace was with the Western Electric Company for eight years, and during that time showed himself to be one of the most brilliant minds in the engineering department of that concern. At the time of his leaving he was in charge of the experimental laboratory and of the circuit design. He was also doing special work for the company on semi-automatic telephone systems.



J. N. Wallace.

His wide experience in telephony makes him an especially valuable addition to the engineering force of the Independents, and the Vote-Berger Company is to be congratulated upon securing his services. His many friends throughout the telephone world will, no doubt, be interested in knowing of the change, and join us in wishing him the best of success. The addition of Mr. Wallace to the engineering corps of the Vote-Berger Company will give that company one of the strongest engineering forces among Independent telephone manufacturers. The Ballast switchboard, of which the Vote-Berger Company is the sole manufacturer, was the one thing most instrumental in securing the services of Mr. Wallace. He was very greatly interested in the Ballast system, and believed that its possibilities are greater than in any other field of telephony. His experience in the designing of special circuits for the Western Electric Company should prove very valuable to the Vote-Berger Company in developing new features and possibilities with the Ballast.

ELECTRICAL SHOW EXHIBITORS.

A meeting of exhibitors and others interested in the third annual electrical show was held at the meeting room of the Edison building November 22, 1907, to witness an exhibition of the plans for booth construction, illumination and decorations for the coming exhibition.

A large perspective of the interior of the Coliseum, as prepared by the architects, D. H. Burnham & Company, was shown and was pronounced by those present as the finest and most artistic arrangement of booths, decorations and decorative lighting ever prepared for an exhibition of this kind.

Among the exhibitors who have contracted for space are the following:

F. Alexander Manufacturing Company, American Automatic Telephone Company, American Clock Company, American Electric Fuse Company, American Electric Novelty Company, American Electric Telephone Company, American Steel & Wire Company, American Telephone Journal, A. & J. Anderson Manufacturing Company, Atlas Anchor Company, Automatic Electric Company, Automatic Igniter Company, M. B. Austin & Company.

B. S. Barnard & Company, Benjamin Electric Manufacturing Company, Big "4" Manufacturing Company, Bristol Company, Buyers' Reference Company.

Central Telephone & Electric Company, Central Electric Company, Century Telephone Construction Company, Chicago Lamp & Reflector Company, Chicago Telephone Supply Company, Chicago Fuse Wire & Manufacturing Company, Chicago Telephone Company, Chicago Pneumatic Tool Company, Commonwealth Edison Company, Frank B. Cook Company, S. H. Couch Company, Crane Company, John F. Cullerton Company, Crescent Manufacturing Company.

Dean Electric Company, Joseph Dixon Crucible Company, Dossert & Company.

Electric Appliance Company, Electrician Publishing Company, Electrical Review, Electric Storage Battery Company, Electrical World, Electrocraft Publishing Company, A. O. Einstein Company.

Federal Electric Company, Ft. Wayne Electric Works.

General Compressed Air & Vacuum Company, General Electric Company.

International Correspondence Schools, International Telephone Manufacturing Company.

Jewell Electric Instrument Company, Johns-Manville Company.

Kellogg Switchboard & Supply Company.

J. Lang Electric Company, Lindstrom-Smith Company.

Manhattan Electric Supply Company, Manufacturers' Record, M. B. Matthews & Brother, Moline Incandescent Lamp Company, Monarch Electric & Wire Company, Monarch Telephone Manufacturing Company, McDowell-Stocker Company, McRoy Clay Works.

National Lamp Association, North Electric Company, North Shore Electric Company, Nungesser Electric Battery Company.

F. W. Pardee, Phoenix Glass Company, Public Service Publishing Company.

John A. Roebling Sons Company, Roth Bros. & Company.

Shelton Electric Company, Solar Electric Company, Sterling Electric Company, Stoltz Electrophone, Stromberg-Carlson Telephone Manufacturing Company, Swedish-American Telephone Company, Swedish Electric Vibrator Company.

Telephony Publishing Company.

United Clock Company, Universal Manufacturing Company.

Vivax Storage Battery Company, Vote-Berger Company.

Wagner Electric Manufacturing Company, Western Electric Company.

THE RURAL BABEL.

Usually when a country subscriber rings anyone up several of his neighbors immediately butt in—not to talk—just listen, says the Grand Fork (N. D.) Herald. Then there are a number of persons gossipping by the way of the telephone, and the business of T. Roosevelt, even, would have to wait, once they get started, till the matters of the entire community have been wafted over the wires. And occasionally a regular talkfest occurs when there isn't much difference in the cyclone of conversation and the flow of soul of a sewing circle. We were switched on to a rural line one evening recently and this is the blast we got in the ear:

"Yah—come ofer; ve vill a leedle beer haben, us and you; ein half barrel—

"—taken as a drench will cure the heaves—

"—of Mrs. Smith, but I don't believe a word of it except that—

"—Ay tank Ay bane goin' to—

"—cut the basque on the bias with the shoulder straps from the waist—

"—hooked on to the evener with a heavy clevice and—

"—shirr the side of the chemise to the corset cover—but not knowing what might bust loose next, right here we hung up the receiver.

TRADE NOTES.

THE CRACRAFT-LEICH ELECTRIC COMPANY, of Genoa, Illinois, in starting out with the idea that the best telephone can be improved upon, has for some weeks past had in its laboratory samples of its new compact type telephone. The few good telephone men, who have seen it, have all admired the accessibility of the apparatus, the design of which was readily recognized as one that was guided by experience.

THE ZOAR BATTERY COMPANY, Zoar, Ohio, has issued two interesting and instructive booklets for the trade, one dealing with Zoar storage batteries and one on battery troubles, including remedies for the same. The former describes the "Zoar quality," which, it is claimed, means a high class battery built on honor rather than mere selling quality. This booklet and the one describing how to remedy battery troubles will be forwarded to those who address the Zoar Battery Company, Zoar, Ohio.

THE BAIRD MANUFACTURING COMPANY, Chicago, Illinois, has just finished and is now putting upon the market, its new sheet steel pay station with its "numerical" code of signals. This signal is: One stroke on a gong for a nickel, two on a gong for a dime and five on a gong for a quarter, and it is undoubtedly the best of signals for pay stations, as it is very simple for the operator to understand, as no education is required, nor is it necessary to distinguish between different musical tones as in pay station signals now used. A complete bulletin, describing these new signals and full line of their apparatus, will be furnished upon request, if TELEPHONY is mentioned.

GEORGE R. BLACKBURN, Cleveland, Ohio, has recently issued a new folder descriptive of the Blackburn ground clamp. He is also mailing a "surprise" blotter, on which are enumerated a few reasons why this clamp should interest telephone men. The Blackburn ground clamp was first introduced to the trade just three years ago and is now being used exclusively by many of the larger telephone companies. The No. A1 improved style was placed on the market about one year ago and is preferred by many because it can be attached without disengaging any of its parts. Lead pipe connections can be made safely by the use of a shoe which prevents the screw from cutting the pipe. Samples and descriptive matter will be furnished on request.

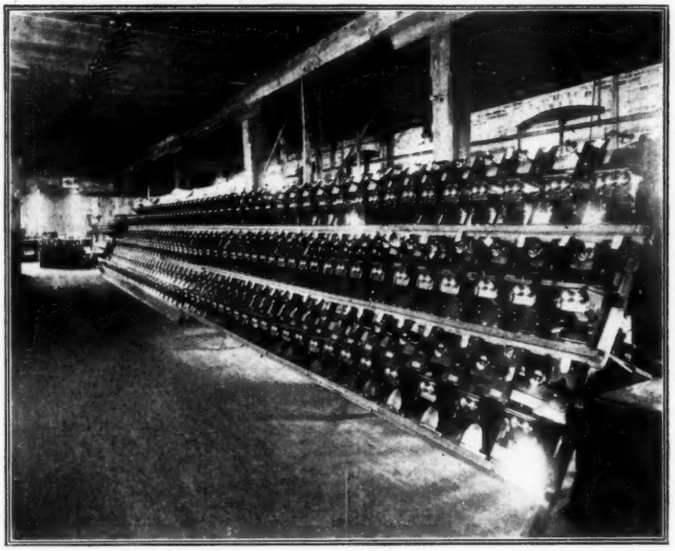
THE WIRE & TELEPHONE COMPANY OF AMERICA, Rome, New York, recently purchased the entire equipment and stock of the Reed Electric Cordage Company of Syracuse, New York. This additional equipment gives the Wire & Telephone Company a manufacturing capacity which enables it to take care of its rapidly growing demand, not only for bare copper wire, magnet wire, and rubber covered wire, but all grades of weatherproof, office, fixture and annunciator wire. The well established trademark "Romeoid" is a guarantee of highest quality and has given this progressive company an excellent standing in the trade. The fact that the company draws the wire for its insulated departments insures a conductor in the insulated product claimed to be perfect in every respect.

WILMOT STEPHENS' CLIMBERS.

Linemen who like to know that they are properly protected when at work usually exercise particular caution as to the quality of climbers and straps they employ. Wilmot Stephens of Binghamton, New York, has been making climbers for something over 25 years and lays particular emphasis upon the superior workmanship of his goods. They are all of the finest quality, hand forged, neatly shaped and correctly spurred. Three grades are made—light, medium and heavy—and their universal excellence has won a great name for them throughout the telephone and electrical fields. Linemen, who prefer to know that their necks are safe when they start up a tall pole, are invited to address Wilmot Stephens, 16 Mitchell avenue, Binghamton, New York, for particulars and prices on his climbers, mentioning TELEPHONY.

AN ELKHART SHIPMENT.

In the accompanying illustration is shown a rack of common battery telephones made by the Chicago Telephone



Rack of Chicago telephones for export.

Supply Company of Elkhart, Indiana, for shipment to South America. A similar shipment was made to Italy during the past month.

MICHIGAN MANAGERS' MEETING.

The first annual meeting of the Independent Telephone Managers' Association of Michigan was held in Battle Creek, November 13-14, in the Business Men's Association rooms of that city. There was a large attendance, composed entirely of members of the association, and a great interest was shown both in the programme, which was carried out as arranged, and in the selection of officers and work of the organization for the ensuing year.

William Robinson.

The following officers were elected: President, William Robinson, manager Citizens' Telephone Company, Muskegon; vice-president, H. T. Clough, district manager Union Telephone Company, Owosso; secretary-treasurer, A. A. Burch, manager Citizens' Telephone Company, Battle Creek.

Upon action of the association, the constitution was changed, enlarging the executive committee to seven members instead of five, as formerly. President Robinson then appointed the following as the executive committee for the ensuing year: F. V. Newman, assistant to the general

manager, Citizens' Telephone Company, Grand Rapids; F. M. Howard, general manager Southern Michigan Telephone Company, Burr Oak; C. B. King, manager Washtenaw Home Telephone Company, Ann Arbor; M. A. Porter, manager Interstate Long Distance Telephone Company, Northville.

The reports of the president and secretary-treasurer showed the association to be in a healthy condition, both financially and otherwise, and one of the most pleasing features of the meeting was the addition of nineteen new members, making a total membership at the present day of 1,016.

Following is a partial list of those in attendance: F. V. Newman, Grand Rapids; William Robinson, Muskegon; H. T. Clough, Owosso; A. A. Burch, Battle Creek; W. W. Wheelock, Traverse City; S. E. Hosmer, Coopersville; G. M. Hall, A. B. Smith, Grand Rapids; W. W. Orr, Holland; H. E. Custard, Grand Rapids; C. J. Litcher, Chicago; H. F. Spier, Battle Creek; L. C. Ealy, Joseph Badour, Allegan; O. Morseman, Pontiac; C. D. Boyd, F. M. Covell, Cleveland, Ohio; M. A. Porter, Northville; C. H. Rauch, Plymouth; C. B. King, Ann Arbor; M. E. Reynolds, Mason; F. C. Harvey, Chicago; R. C. Smith, Homer; C. G. Fitzsimmons, Reading; J. A. Russell, William Hannan, Chicago; C. E. Smith, Cadillac; J. A. Page, Middleville; Cyrus J. Rath, Cadillac; J. H. Britton, Owosso; C. L. Pater, Mt. Pleasant; A. M. Edmunds, Bedford; A. R. Butterfield, Alma; N. B. Serviss, Owosso; A. Snowdin, Ravenna; Thomas Christie, Muskegon; E. F. Barber, Traverse City; A. Stratemeyer, Battle Creek; J. E. McElwain, Hastings; C. L. James, Homer; V. R. Cummings, Bellevue; F. C. Hughes, Lansing; D. J. Campau, Ionia; W. R. Grayburn, Albert Clark, Lacey; I. R. Close, Pontiac; F. G. Howard, Greenville; F. L. Francis, Portland; W. J. Stanton, Chicago; E. W. Jordon, Bedford; J. C. Furniss, Nashville; W. J. Robinson, Chicago; W. S. Vivian, Grand Rapids; F. M. Howard, Burr Oak; R. L. Kimble, Chicago; John Fuller, Grass Lake; C. R. Kehoe, Jackson, C. E. Tarte, Grand Rapids; E. R. Field, Chicago; E. H. Crowley, St. John; H. E. Jeffery, Chicago; C. B. Blens, St. Johns.

The convention received a very hearty welcome from the mayor of Battle Creek, Charles C. Green, which was responded to by the retiring president, F. V. Newman, of Grand Rapids, after which followed the report of the president, other officers and committees, and the election of officers for the ensuing year. The following papers were then read: "Testing and Locating Trouble," H. E. Custard, special inspector Citizens' Telephone Company, Grand Rapids; "Suggestions as to the Best Methods of Handling Through Toll Business," J. P. Boylan, traffic manager Home Telephone Company, Detroit; "Switchboard Troubles," R. C. Smith, manager Homer Telephone Company, Homer; "Line Troubles," C. L. Pattee, manager Union Telephone Company, Mt. Pleasant; "Instrument Troubles," V. R. Cummings, manager Citizens' Telephone Company, Bellevue; "What Information Should the Inspector Impart to the Patron," M. A. Porter, manager Interstate Long Distance Telephone Company, Northville; "The Association Bulletin," W. S. Vivian, editor and secretary Michigan Independent Telephone Association, Grand Rapids.

One feature of the convention that was a decided success was the question box in charge of A. A. Burch, assisted by C. B. King, of Ann Arbor, and W. B. Serviss, of Owosso. The questions asked were right to the point and created considerable discussion which was decidedly helpful. Wednesday night the association served its members an elaborate banquet at the Halladay Inn, after which the company attended the Vaudette, owned and operated by Harry Knapp, formerly of the Citizens' Telephone Company, of Grand Rapids. Mr. Knapp treated the convention to the last performance of the day, and then the hall was turned over to the members of the convention for their especial enjoyment. C. E. Tarte was toastmaster, both at the banquet and during the performance in the Vaudette, and the manner in which he put the members through their paces showed that he knew what they could do. Everyone had to perform a "stunt," either singing a song, telling a story, or giving a dance.

COMMENDING TELEPHONE INVESTMENTS.

There is solid food for thought in the following from the pen of Theodore Gary, president of the International Independent Telephone Association:

"When a stranger is asked to consider a telephone investment, it is not unlikely he will be laboring under an unfavorable impression of its stability. He more than likely sizes up the business, by estimating a telephone that he knows must not cost more than $12 or $15, or a pole, that he has a very poor impression about. It may be a crooked one, very badly set, leaning and old, likely decayed, then he will add a little rusty wire. The whole cost not more than $20 per station. This constitutes a telephone plant in the average mind. That the telephone business, based on such an idea, does not appeal to the average man as a stable business is true. He cannot help associating it with something very easily destroyed by storm or sleet. With such ideas there is very little that is substantial about telephone plants. Then, when the real cost is mentioned, a look of disgust appears, since the figure is from five to ten times greater than the value he had in mind. Then, again, the thing seems to be a petty business, with much slight earnings for the investment claimed, say $1.50 to $3 per station per month. All looks small when the telephone man is claiming an investment of from $100 to $200 for each telephone in a plant. That these are correct estimates of the basis of reasoning and conclusions of the casual observer, there can be no doubt.

"The telephone business bears acquaintance, investigation and comparison, and will stand the test of everyday association. In the first place the old open, iron wire methods of construction have been abandoned, and the new method, being so much less conspicuous, has never made much impression upon the mind, since in all the larger plants eighty per cent of the cost of a plant is underground. But little of such plants is where it can be seen, even the up-to-date aerial construction. The mind remembers only the tall poles, with eight or ten cross arms, with eighty or one hundred exposed wires, with the unsubstantial appearance.

"Now, a much shorter pole will carry cables with 800 wires, the material being copper and lead, that have a very large per cent of indestructible value; besides, the danger from storm and sleet is removed. While such construction is so much less noticed than the old method of tall poles and immense groups of tangled wire, still the insecure and flimsy impression remains, notwithstanding the greatly superior construction. But back of the plant is the mainstay that is entirely invisible, that is the business on the books of a company, the earning power, that is really the key note and the kernel carrying the real value. A good way to apply the test is to look up telephone service bills and see how long and how regularly they have been paid, and then figure out, if you can, when you expect to do without your telephone service. Then the stability of the business will begin to strike in, and the real value of a telephone property will appear. There can be no doubt of the stability of this great and growing time saver and space annihilator.

"The business has proved its ability to live by thirty years of life and hundreds of millions in dividends and interest returned to its stockholders and investors. A right estimate can only be arrived at by eliminating impressions of the old style of flimsy pole lines from the mind and fix the mind on the new methods of construction, and the substantial business itself."

LETTERS TO TELEPHONY

Some Interesting Communications Received from Advertisers and Subscribers

Telephony Publishing Co., Chicago, Ill. Gentlemen: Two or three months ago we announced in TELEPHONY *that we would send free to any inquirer a copy of the National Underwriters' specifications for the installation of telephone protectors. The result of this announcement has been an astonishingly large number of requests for this book.*

We have now received up to date, 1,392 inquiries and requests for this book of Underwriters' Rules. This indicates to us two things, first that TELEPHONY *as an advertising medium is unsurpassed and, second, that our booklets fill a long felt want. We feel you are entitled to the credit which follows this rather extraordinary result of our trade note and take pleasure in giving you a statement of the facts.*

Yours very truly,
American Electric Fuse Company,
Muskegon, Mich.

Telephony Publishing Company, Chicago. Gentlemen: This is to confirm telegram sent you this day asking for fifty copies of the last issue of TELEPHONY *ready for mailing. Please advise me if we can get more in case of necessity within the next ten or fifteen days.*

Very Truly Yours,
Edward E. Clement,
Washington, D. C., Chief Engineer and Treasurer National Engineering Co.

Telephony Publishing Company, Chicago: I received a sample copy of TELEPHONY, *with which I am much pleased and in consequence am enclosing a draft for one dollar ($1.00), for which please send me* TELEPHONY *beginning with the November number. Would rather subscribe now than to take up three months offer, as I will not have to bother about it and I am sure to be pleased. Enclosed find a few questions which I would like to have answered by your question department.* *Yours truly,*
George W. Christie,
Long Prairie, Minnesota.

Telephony Publishing Company, Chicago. Gentlemen: Your inquiry incident to a proposition for the increase in our advertising space, received, and we beg leave to advise you that our business does not warrant an increase in our advertising at this time. You may be interested to know that as a result of our half page advertisement, which dealt exclusively with our synchronous time system for telephone companies, we have had a most satisfactory line of inquiry, the volume of which has even been a surprise to us. I think we have had letters from every state in the union and as a result of same we expect a larger business along that line than we shall be able to take care of, although we are more than doubling our manufacturing capacity in every department of our factory.

This, you will see, is one instance where the efficiency of your service has been detrimental to the increase of your business, at least for the present time. We want to assure you, however, of our high appreciation of the service you have rendered us and we believe that the investment we have made in the space in TELEPHONY *has been as good a dividend payer as any that we have been able to take advantage of for some time.*

Wishing you continued success, we beg leave to remain,
Yours very truly,
American Clock Company, Chicago.
By Ed. S. Eves, General Manager.

Telephony Publishing Company, Chicago. Gentlemen: Enclosed please find check for classified advertisement and subscription for TELEPHONY. *From the little notice we inserted in your classified column we received enough replies to sell three times the amount of stuff we had to offer.* *James A. Johnson,*
Owenton, Kentucky.

Telephony Publishing Co., Chicago. Gentlemen: We have your descriptive circular of Homan's "A. B. C." telephone book, price $1.00. Kindly send us a copy of the same and include the amount with your next invoice. We are very much pleased with the new ad which surely will be a winner and desire to thank you for the kind attention you have given us regarding this. Our business continues to grow in volume and to become more satisfactory every day and we cannot help but attribute a part of our success to the advertising in TELEPHONY. *Yours truly,*
Indiana Steel & Wire Co.,
Robert Miller, G. S. A.

Telephony Publishing Company, Chicago. Gentlemen: Please send us one dozen copies of TELEPHONY, *November issue. And oblige.*

The North Electric Company,
A. A. Marrs, Manager, Elyria, Ohio.

Telephony Publishing Company, Chicago. Gentlemen: Enclosed find $1.00 for which please renew my subscription to TELEPHONY, *so there may be no break in the file. Please see other side for date of expiration of last year's subscription. The replies received from you, replying to my letters of inquiry about puzzling troubles have been worth twenty times the subscription, and I thank you very much.* *Very respectfully,*
Chas. M. Grover,
San Rafael, New Mexico.

Telephony Publishing Company, Chicago. Gentlemen: Please send 200 copies of the last issue of TELEPHONY *to W. S. McDonald, vice president Commonwealth Trust Company, Detroit, Michigan, and sixty copies to me direct.*

Very truly yours,
William B. Woodbury,
Secretary-Treasurer Home Telephone Company, of Detroit.

Editor TELEPHONY, *Chicago. Dear Sir: Please send us immediately fifty copies of* TELEPHONY. *Advise us of the price.*

Truly yours,
Redaktion und Verlag
der
Zeitschrift fur Schwachstrom,
Technik.
Munich, Germany.

Telephony Publishing Company, Chicago. Gentlemen: Please send fifty-two copies of the November issue of TELEPHONY *to the list given below and also send ten additional copies, to me personally.* *Yours very truly,*
James B. Hoge,
Cleveland, Ohio.

The Telephony Publishing Company, Chicago, U. S. A. Gentlemen: We shall be much obliged if you will kindly increase our order for TELEPHONY *to thirty-four copies, sending us the back numbers from August as soon as possible.*

On receipt of invoice for the extra four copies for the year, we will forward remittance.

Trusting to receive your prompt attention, we are, dear sirs,
Yours faithfully,
H. Alabaster, Gatehouse & Co.
4 Ludgate Hill, London, E. C., England.

The TELEPHONY, *Chicago: One of our friends recommended us your paper called the* TELEPHONY, *and as we are interested in this line of business we ask you to send us the latest number and quote us lowest prices franco Olmitz (Austria) for yearly advertisement. Awaiting your quickest answer.* *Truly yours,*
Telephon-und Telegraphenwerke,
Robert v. Lieben, Olmutz, Austria.

Telephony Publishing Co., Chicago. Gentlemen: Enclosed please find $1.00 for one year's subscription to TELEPHONY. *I could not do without this valuable paper, and continue in the Independent telephone field. Yours truly,*

W. D. Horton,
Manager McRae-Helena Telephone Company,
McRea, Georgia.

I intend to be a constant user of TELEPHONY *because I consider it one of the best magazines ever put before the Independent telephone field and no manager or telephone man can afford to be without it.—Extract from letter from W. W. Libhart, manager Local Telephone Company, Norwalk, Ohio.*

Telephony Publishing Company, Chicago. Gentlemen: Enclosed find $1.00, for which please continue my subscription to TELEPHONY *for one year. Please see that the subscription begins with the October issue as I do not want to miss a copy.*

Yours very truly,
Sam H. Shutt,
Bell County Telephone Company,
Temple, Texas.

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by O. H. Brandenburg

Calvin Fletcher has the contract to 150 telephone poles to Mt. Vernon.—*Belleville (O.) Messenger.*

Our telephone line is now completed in full. Everyone has his telephone.—*Cambridge (O.) Jefferson.*

A telephone line is being built from Getup to Oleander, Marshall county.—*Birmingham (Ala.) News.*

The telephone company are pushing a new line out past Gus Johnson's farm.—*Albert Lea (Minn.) Tribune.*

The telephone men are at Grigsby's, putting in a line over east—*Arnold Correspondence, Livermore (Ia.) Gazette.*

Herbert Willis brought out supplies for the construction of a branch telephone line Saturday.—*Mud Creek Items, Ottawa (Kan.) Herald.*

The new telephone building will be a great relief. As it is now you have to tell your business to the public.—*Cornwall Dispatch, Newburgh (N. Y.) News.*

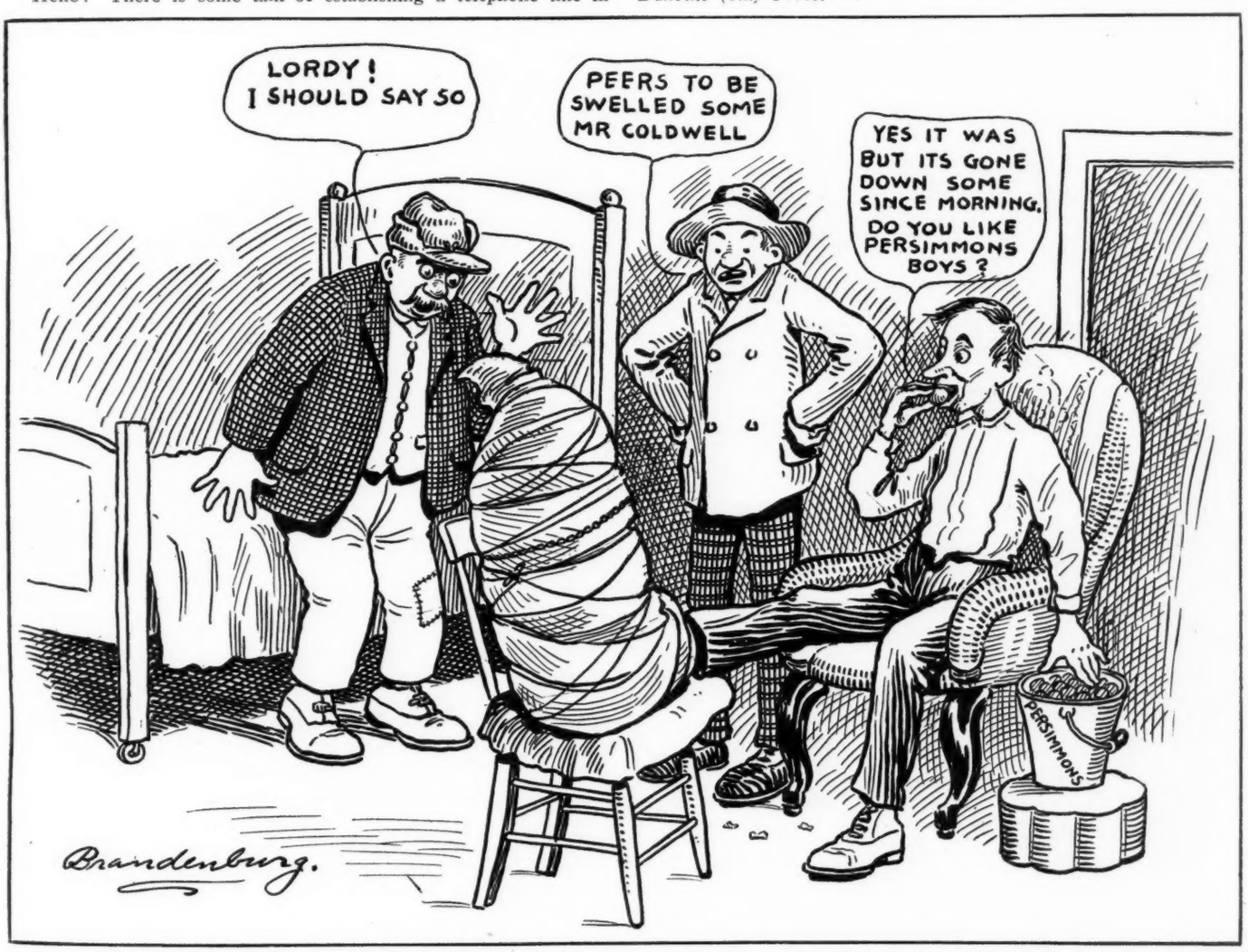
How convenient a telephone is we found out one day last week. Now farmers, why can't we have it when the main line runs close by. Think it over.—*Kingman Tell-Tales in Olivia (Minn.) Review.*

Hello! There is some talk of establishing a telephone line in this community. Let 'er come, then we can save horse flesh and axle grease by sparking our better half over the wire.—*Sloan (Ia.) Star.*

The Independent telephone system has just completed the new line between Pingree and Clare. The telephones have just been placed and are ringing gaily.—*Clare Correspondence, Jamestown (N. D.) Alert.*

The Molly Falls Telephone Company put a new switchboard in the central office Monday and a telephone into the residence of Mark Wheeler at East Peacham.—*Peacham Correspondence, St. Johnsbury (Vt.) Caledonian.*

The young ladies employed by the Vermillion County Telephone Company had the joke turned on them when they invaded the home of one of their number, Miss Louise Grabs, last evening, and gave her a surprise and package shower. The surprise came when Miss Grabs announced that she was already a bride and had been working with the other girls for the past two weeks without anyone suspecting it. She announced that her expected wedding was off and that she was already the bride of Will Uhrig, a machinist employed at the Chicago & Eastern Illinois railway shops.—*Danville (Ill.) Press.*


LORDY! I SHOULD SAY SO
PEERS TO BE SWELLED SOME MR COLDWELL
YES IT WAS BUT ITS GONE DOWN SOME SINCE MORNING. DO YOU LIKE PERSIMMONS BOYS?
PERSIMMONS
Brandenburg.

W. R. Coldwell, an inspector for the Bell Telephone Company, turned his ankle yesterday while hunting persimmons and his foot swelled so badly that walking was impossible. After resting all day yesterday and last night he was able to hobble about to-day and left this morning for Carrollton.—*Edwardsville (Ill.) Intelligencer.*

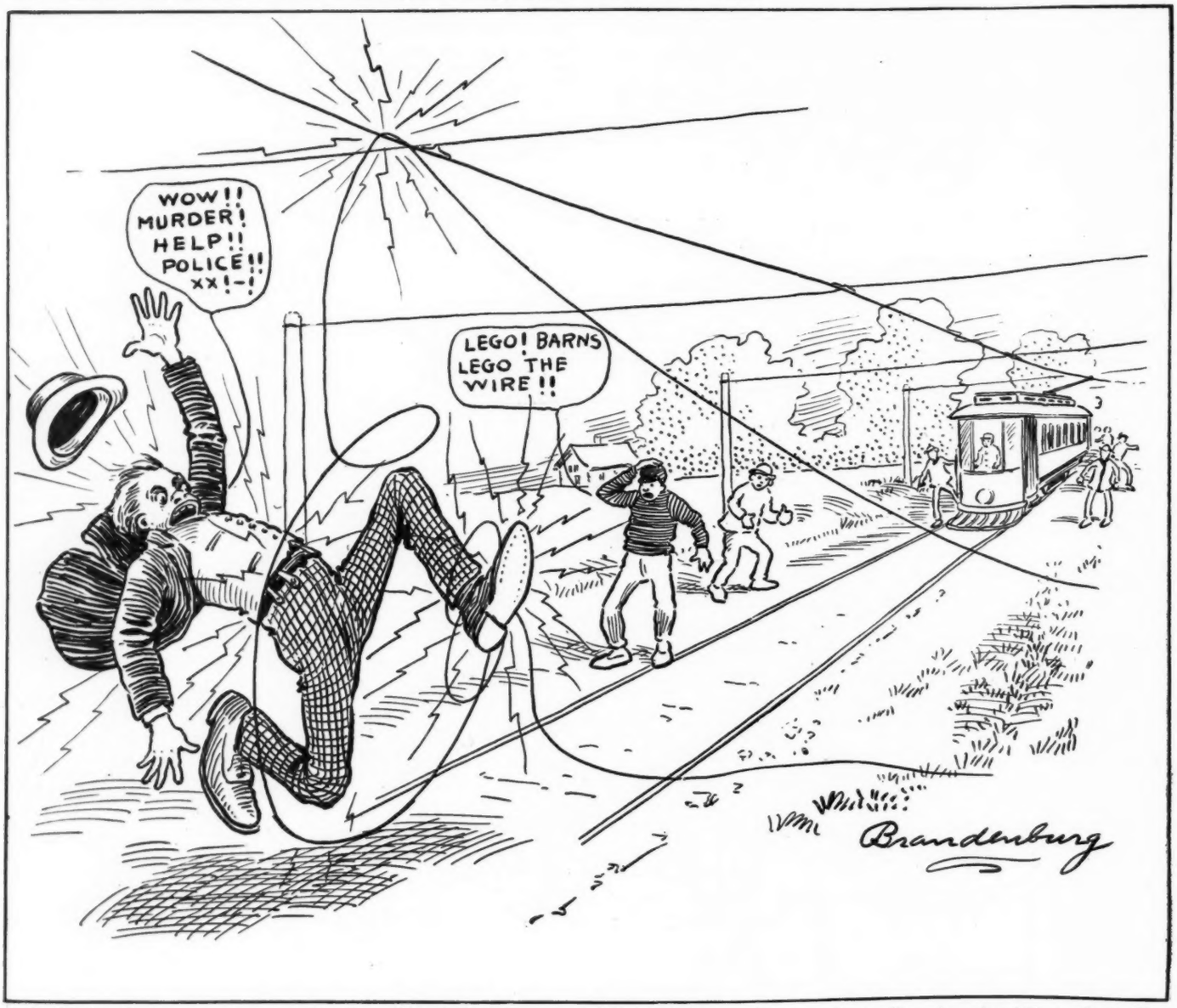
Mr. and Mrs. George Dice, the telephone managers, took a day off last Tuesday and spent the day in the country with Mr. and Mrs. Fred Drummond.—*Gallatin (Mo.) Missourian.*

Our central telephone service has been off duty for a few days owing to the moving of our switch into the new exchange building. Ed Nicholas is reported as having assumed charge and we look for good service, as Ed knows the how of it.—*North Hollow Letter in Galena (Ill.) Gazette.*

Subscribers of the Hertel and Shell Lake telephone line met Thursday and decided to organize as the Bashaw Valley Telephone Company. There was a big turn out. They decided not to use the telephone for a whistle any more.—*Hertel Correspondence, Shell Lake (Wis.) Register.*

James W. Kirk, manager of the Osakis Telephone Company, has taken a life partner, and though "Jimmie" has been a very busy boy for a few days previous to the momentous event, he feels that he hasn't been spending his time "chasing trouble." The bride is Miss Hattie Lunceford, one of Todd county's charming young ladies, who has spent much of her time in Osakis and is held in highest esteem by her many friends in this city.—*Osakis (Minn.) Review.*

One of the annual meetings that didn't meet was that of the Farmington Telephone Company, called for last Friday night. After a day when the sun drew blisters on the brick buildings and the atmosphere was so dead that enough energy for an occasional dust eddy could not be aroused, the business men who had been sopping up the fryings of the heat all day, could not be cajoled away from cool spots in front of their places of business.—*Farmington (Ill.) Bugle.*



J. Walter Barnes, manager of the Consolidated Tel. Co., got tangled up in a live wire at Morganton this week, but he survived the shock and told the Democrat over the wire how it all happened. Mr. Barnes was out with his men Thursday morning stringing a telephone wire over the trolley, the wire fell on the trolley wire, one end of it hit Mr. Barnes' shoe and made him "hot-foot" around to the tune of 550 volts! But he soon recovered.—*Parsons (W. Va.) Democrat.*

In my last letter I reported Abe Metz and Manny Spurgeon working for the American Telegraph and Telephone Co. The report in fact was correct, for the boys left here Thanksgiving Day with a four-horse team. They drove to Scales Mound, where they were to get their load. Next day they put on the load of poles that settled the wagon into the mud until four horses could not move it. After breaking the harness and the seventh commandment they unloaded the poles, dug the wagon out of the mud and fixed up for an early start next morning. During the night the ground froze, leaving the roads like the hills described by the Arkansaw Traveler. But bright and early the boys started for the Apple River Bluffs, near the Thompson old mill, where the poles were wanted. After bumping along amid cold and hunger for several miles, they, like the prodigal, repented when thoughts of home and plenty caused tears to dim their eyes, and they then unloaded the poles and started for Stockton. After twice being lost and locating Schapville and Woodbine, the boys arrived here about midnight glad to be alive. Metz says he does not see the need of a game warden in some parts of Jo Daviess county, for all the game he saw was not fit to eat, for rabbit and squirrel have the sweeney from jumping down the bluffs and all fowls had corns and stonebruises on their feet.—*Ward's Grove Correspondence Galena (Ill.) Gazette.*

SWORN CIRCULATION THIS ISSUE OVER 10,000 COPIES.

622.05
T268
ENGINEERING LIBRARY
LIBRARY OF CONGRESS DEC 1 1907 TECHNICAL DIV

Telephony.

VOLUME XIV.
NUMBER 6.

AN ILLUSTRATED MONTHLY TELEPHONE JOURNAL

$1.00 PER YEAR
15 CENTS A COPY

COPYRIGHTED, 1907.
ALL RIGHTS RESERVED.

CHICAGO, DECEMBER, 1907.

PUBLICATION OFFICE:
201-205 MANHATTAN BLDG.

Standard Underground Cable Co.

Pittsburg. Boston. St. Louis. New York. Philadelphia. Atlanta, Ga. Chicago. San Francisco. Los Angeles, Cal.

BARE AND WEATHERPROOF COPPER WIRE AND CABLES
RUBBER INSULATED WIRE AND LEAD COVERED CABLES.

WE FURNISH, INSTALL AND GUARANTEE EVERYTHING CONNECTED WITH TELEPHONE WIRE AND CABLE ACCESSORIES.

THE GENERAL ENGINEERING CO.

Consulting and Contracting Engineers

Complete Telephone Plants

135 Adams Street
CHICAGO

CHAS. G. STEVENS CO.

BRIGHT COLD ROLLED AND COLD DRAWN

NORWAY IRON, MAGNET STEEL

Cold Drawn Steel—Rounds, Flats, Square, Hexagons.

COLD ROLLED STRIP STEEL

LARGE STOCK ALWAYS ON HAND.

58-60 South Canal Street, CHICAGO

JONES & WINTER

INDEPENDENT

Telephone Engineers and Contractors

1258 Monadnock Bldg., CHICAGO, ILL.

WRITE FOR OUR REFERENCES

DEARBORN TELEPHONES

make satisfied customers

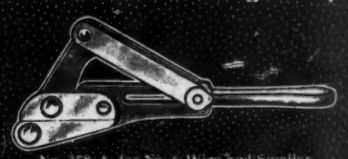
A trial order will convince you of their high quality and our low prices will please you.

Send for Catalogue No. 38

DEARBORN ELECTRIC CO.
CHICAGO

CHICAGO TELEPHONES SATISFY

Klein's New "Chicago Grip"



No. 358-A, for No. 6 Wire and Smaller

Is made of steel forging, polished, and nickel-plated. It is a well proportioned and reliable tool. The draw link is arranged so it does not fall in the way of the wire. It holds fast on iron or copper wire.

All prominent supply houses carry our products. Write to-day for our "RED BOOK." It is of pertinent interest to every telephone man, and will be sent free, upon request.

MATHIAS KLEIN & SONS
83 West Van Buren Street - CHICAGO, ILL.

NEW YORK INSULATED WIRE CO.

TELEPHONE WIRES AND CABLES

SAN FRANCISCO CHICAGO BOSTON NEW YORK

CHICAGO TELEPHONE SUPPLY CO.

FACTORY AND GENERAL OFFICES

ELKHART, IND. U.S.A.

McROY CONDUITS

CHICAGO
ROOKERY BUILDING

ADVERTISING INDEX, PAGE 2.

CLASSIFIED ADVERTISERS INDEX, PAGES 91 TO 97.

Platinum Rivets

All forms of Platinum Contacts for telephone construction

CATALOGUE FURNISHED ON REQUEST

BAKER & CO., Inc.

New York Office: 120 Liberty Street

Newark, N. J.

The Indiana Rubber & Insulated Wire Co.

Manufacturers of

Insulated Wires and Cables

PARANITE TRADE MARK

JONESBORO, : IND.

TELEPHONE WIRES

RUBBER COVERED ALL STYLES

Drop Wire
Spider Wire
Pot Head Wire
Flame Proof Telephone Wire
Braided Interior Telephone Wire

Trade Mark

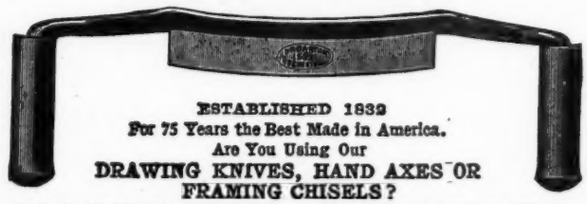
MARION INSULATED WIRE & RUBBER CO.

Main Office & Factory: MARION, IND.

Office & Warehouse: 88-90 W. Van Buren Street, CHICAGO

The Famous D. R. BARTON TOOLS

FOR TELEPHONE PURPOSES



ESTABLISHED 1832

For 75 Years the Best Made in America.

Are You Using Our

DRAWING KNIVES, HAND AXES OR FRAMING CHISELS?

Write for Catalogue and Price List. If Your Local Dealer Doesn't Handle Our Goods, Send to Us Direct.

D.R.BARTON 1832. ROCHESTER, N.Y.

MACK & CO., SOLE MAKERS

(Successors to D. R. Barton)

ROCHESTER, N. Y.

Alphabetical Index to Advertisers

American Cable Clip Co..... 93
American Clock Co..... 4
Am. Elec. Fuse Co....33-37-39-41
American Elec. Telo. Co..19-100
American Electrical Works...100
Am. Ins. Wire & Cable Co... 45
Amer. School of Corresp'd's.. 26
American Sewer Pipe Co..... 84
Anderson Forge & Mach. Co.. 81
Andrae & Son, Julius..... 32
Andrews Co., A. H..... 92
Armac Motor Co..... 81
Atlas Anchor Co..... 96
Automatic Electric Co..... 25

B. R. Elec. & Telo. Mfg. Co. 76
Badger Pin Co..... 90
Baird Mfg. Co..... 44
Baker & Co., Inc..... 2
Barnard & Co., B. S..... 84
Beidler Mfg. Co., Francis..... 87
Belden Mfg. Co.....43-100
Bissell Co., F.....93-95-96
Blackburn, Geo. R..... 98
Blake Signal & Mfg. Co..... 97
Brixey, W. R..... 6
Bunge, Otto 100
Buyers Directory 91-97

Calculagraph Co. 77
Camp Co., H. B..... 84
Candy & Co..... 78
Central Electric Co..... 42
Central Telo. & Electric Co.. 43
Century Telephone Const. Co. 11
Chase Shawmut Co. 16
Chicago Telo. Supply Co.....1-3
Classified Index 91-97
Clay Product Co..... 85
Clement, E. E..... 92
Commercial Elec. Sup. Co.... 36
Cook, Frank B..... 22
Corwin Telephone Mfg. Co... 38
Cracraft-Leich Elec. Mfg. Co. 5
Crescent Lumber Co..... 96
Croselmire & Ackor..... 94
Crumb & Co., W. H..... 97
Current Electric Co..... 47

D. & W. Fuse Co..... 81
Davis Chair Co..... 76
Davidson & Gallmeyer Lbr.Co. 94
Davison & McBryde..... 88
Dean Electric Co..... 12
Dearborn Electric Co..... 1
Dearborn Engraving Co..... 82
Denio General Electric Co.... 34
Detroit Insulated Wire Co.... 90
Diamond Expansion Bolt Co. 85
Diamond State Fibre Co..... 99
Doubleday-Hill Electric Co... 83
Duluth Log Co. 27
Duplex Metals Co..... 89
Durant Elec. Supplies Co..... 75

Electric Appliance Co..... 10
Electric Storage Battery Co.. 79
Electrical Exposition 18
Ellwood Ivins Tube Works... 88
Ericsson Telo. Mfg. Co., L. M. 23
Evertsick Anchor Co. 83

Farr Telo. & Const. Sup. Co.. 93
Felsenthal & Co., G..... 92
Fibre Conduit Co., The..... 40
Fisher-Stevens Co. 78
Foote & Pierson..... 82

General Electric Co..... 83
General Engineering Co..... 1
General Insulate & Mach. Co. 80
Gray Telo. Pay Station Co... 38
Griffin, Frank B..... 90

Hagstrom Bros. 99
Hallett Iron Works..... 94
Hemingray Glass Co..... 36
Holtzer-Cabot Elec. & Mfg. Co. 85
Houston & Liggett..... 88
Hubbard & Co..... 94
Humbird Lumber Co..... 31

Illinois Electric Co..... 20
Ind. Rubber & Ins. Wire Co.. 2
Indiana Steel & Wire Co.... 40
International Telo. Mfg. Co.. 41
Itasca Cedar Co..... 28

Jackson, D. C. & Wm. B.... 97
Jones & Winter..... 1

Kraeuter & Co..... 97
Klein & Sons, Mathias..... 1

Lanz & Sons, M..... 94
Lewis Lumber & Mfg. Co.... 96
Lindsley Bros. Co..... 89
Little & Co., W. F..... 93
Long Distance Telo. Mfg. Co. 76

Mack & Co..... 2
Maine Hub & Mfg. Co..... 89
Marion Ins. Wire & Rub. Co. 2
Massachusetts Chemical Co.. 97
Matthews & Bro., W. N..... 95
McDowell Mfg. Co..... 94
McMeen & Miller..... 92
McRoy Clay Works..... 1
Middleton & Co., J. W..... 97
Miller Anchor Co..... 96
Monarch Telephone Mfg. Co.. 17
Moon Mfg. Co..... 35
Morrison Lumber Co., J. W.. 94
Mountain State Electrical Co. 80
Mueller Co., The William.... 29
Mullin, Colman J..... 78
Murdock & Co., W. J.....100

Nash & Co., Geo..... 95
Nashville Tie & Cedar Co.... 88
National Carbon Co..... 98
National Galvanizing Co.....100
National India Rubber Co.... 89
National Pole Co..... 31
National Telo. Supply Co..... 99
Naugle Pole & Tie Co..... 30
Nebr. Bridge Sup. & Lbr. Co. 90
N. Y. Insulated Wire Co..... 1
North Electric Co..... 21
Northwestern Elec. Equip. Co. 93
Nungesser Elec. Battery Co.. 79

Okonite Co., Ltd..... 44
Oliver Mfg. Co., A. F..... 77
Oliver Mfg. Co..... 85
Oshkosh Logging Tool Co.... 33

Pacific Coast Pole Co..... 89
Page & Hill Co..... 87
Partridge Lumber Co., T. M. 86
Paducah Pole & Timber Co.. 88
Peirce Specialty Co..... 90
Pendleton & Gilkey..... 86
Potter & Co., Alfred L..... 95
Premier Electric Co..... 46
Protective Electrical Sup. Co. 80

Raber & Watson..... 32
Reidy, John J.....100
Richards Chair Panel Co..... 92
Roberts Telo. Co., Homer..... 14
Rock Island Battery Co..... 79
Roebling & Sons, John A.... 45
Runzel-Lenz Elec. Mfg. Co... 8

Sand Pt. Lbr. & Pole Co. Ltd. 30
Sandwich Pole Changer Co... 47
Scovill Mfg. Co..... 99
Scranton Button Co., The.... 75
Sellers Co., R. H..... 13
Solar Electric Co..... 92
Southern Pine Mfg. Co..... 90
Stand. Underground Cable Co. 1
Star Expansion Bolt Co.....100
Stephens Co., Wilmot..... 98
Sterling Electric Co.....34-35
Sterling Insulated Wire Co... 75
Sterling & Son, W. C..... 86
Stevens Co., Chas. C..... 1
Stevenson, Guy 96
St'mb'g-Carison T. M. Co..7-9-99
Sumter Telephone Mfg. Co... 42
Swedish-Amer. Telo. Mfg. Co. 48

Telephone Printing Co..... 97
Telephone Review Pub. Co.... 95

Universal Cable Grip Co..... 37
Valentine-Clark Co. 28
Veeder Mfg. Co..... 77
Vogel, Herman 95
Vote-Berger Co. 15

Wagner Shingle Co., G. N.... 96
Want Advertisements 98
Warner Electric Co..... 46
Wesco Supply Co..... 24
Western Lumber & Pole Co... 89
Western Telephone Mfg. Co.. 75
Weston Elec. Inst. Co..... 39
Wilder, Geo. W..... 97
Wire & Telo. Co. of America. 82
Wittenberg Cedar Co..... 87
Woods Electric Co..... 93
Worcester, Co., C. H..... 29

Yonkers Specialty Co.....100

CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONES SATISFY

THINK IT OVER

Don't you think there are many farmers, and others, who not only want the telephone for use, but who would prefer to buy some stock in a telephone company like yours, which is perfectly safe and pays well, rather than to let the money lie in the family sock, or in the local bank, while the owner lies awake nights, wondering what will happen next?

CHICAGO TELEPHONE SUPPLY CO.

Factory and General Office: ELKHART, INDIANA

These Catalogs are at Your Disposal:

43—General
44—Bridging and Series Telephones
45—Bell Type Express Switchboards
46—Visual Signal Switch and Toll Boards
47—Common Battery Apparatus

CHICAGO TELEPHONES SATISFY

CHICAGO TELEPHONES SATISFY

To concentrate your efforts, try TELEPHONY'S full service, exclusively.

H. O. JACKSON
President American Clock Company

I WANT you to know about a chance to make big profits in a clean, honest business indorsed by the U. S. Government and many of the largest Banks, Railroads, Manufacturers and Wholesale and Retail Concerns in the country. My 24-page book explains. It is FREE. Send for it to-day.

I AM President of the American Clock Company, the largest maker of Electric Time Stamps, Time Recording Systems, Telephone Synchronous Time Systems and Secondary Clock Systems in the Country. Our products are known and used the world over and have taken the highest honors at international expositions in this country and abroad.

American Electric Clocks and Time Systems are recognized everywhere as standard, and as they are fully protected by basic patents, we have a practical monopoly.

Among the users of our goods are the U. S. Government, Banks, Hotels, Railroads, State Institutions, City Governments, Big Manufacturing Plants, Wholesale and Retail Commercial Houses, Telephone Companies and hundreds of large public and private concerns, which regard our goods as business necessities as indispensable as the typewriter or telephone.

The business has grown so rapidly that with our present capacity it is impossible to supply the practically unlimited demand for our goods. During the past twelve months our books show an actual increase in orders of over 200 per cent. It is now merely a matter of getting ready as quickly as possible to fill the enormous waiting demand.

We have a model plant, splendidly adapted to our purposes, equipped in every department with special tools and machinery. The main buildings have about 80,000 feet of floor space, with ample ground adjoining for building purposes. We also have a permanent force of high-grade men, superintendents, foremen and mechanical experts, who have been specially trained in the business and are capable of handling a big force of workmen.

What we need now, in order to reach the wonderfully rich profits that lay right at our door, is an immediate increase of 400 or 500 men in the various departments. This means a considerable cash outlay in our pay rolls. To provide for it, without curtailing our resorces in the purchase of raw material, etc., we have decided to issue a limited amount of preferred stock, which will be a first lien on all the assests, and should pay yearly profits of from 50 to 100 per cent.

I have prepared a 24-page book fully describing the business of the American Clock Company and setting forth all the facts. In this prospectus I give you absolute proof. I show you actual photographs of the plant, and submit figures covering profits based on facts that cannot be disputed.

I strongly advise you for your own sake to send for this book. It will cost you nothing to get it and it may be the means of making you a great deal of money. I have no salesmen, no agents, no middlemen of any kind. You simply send for the book, read it quietly in your own home, and, after carefully considering the facts, make up your mind for or against taking an interest in the American Clock Company's great and growing business.

If you decide to come in with us, please remember this: You will be dealing direct with the Company, whose standing, credit, and absolute responsibility can easily be determined by referring to Dun's, Bradstreet's, any Express Company, or any of the big business concerns in Chicago.

Not a single dollar of stock subscriptions will go to "promoters". Not one dollar will be misapplied. Each shareholder will get a "square deal." His interest will be fully protected, whether his holdings be large or small. The entire enterprise will be managed, as it always has been managed, on straightforward business principles, strictly in the interests of those who own the stock.

Address your requests for the book to me personally—

H. O. JACKSON,

President American Clock Company

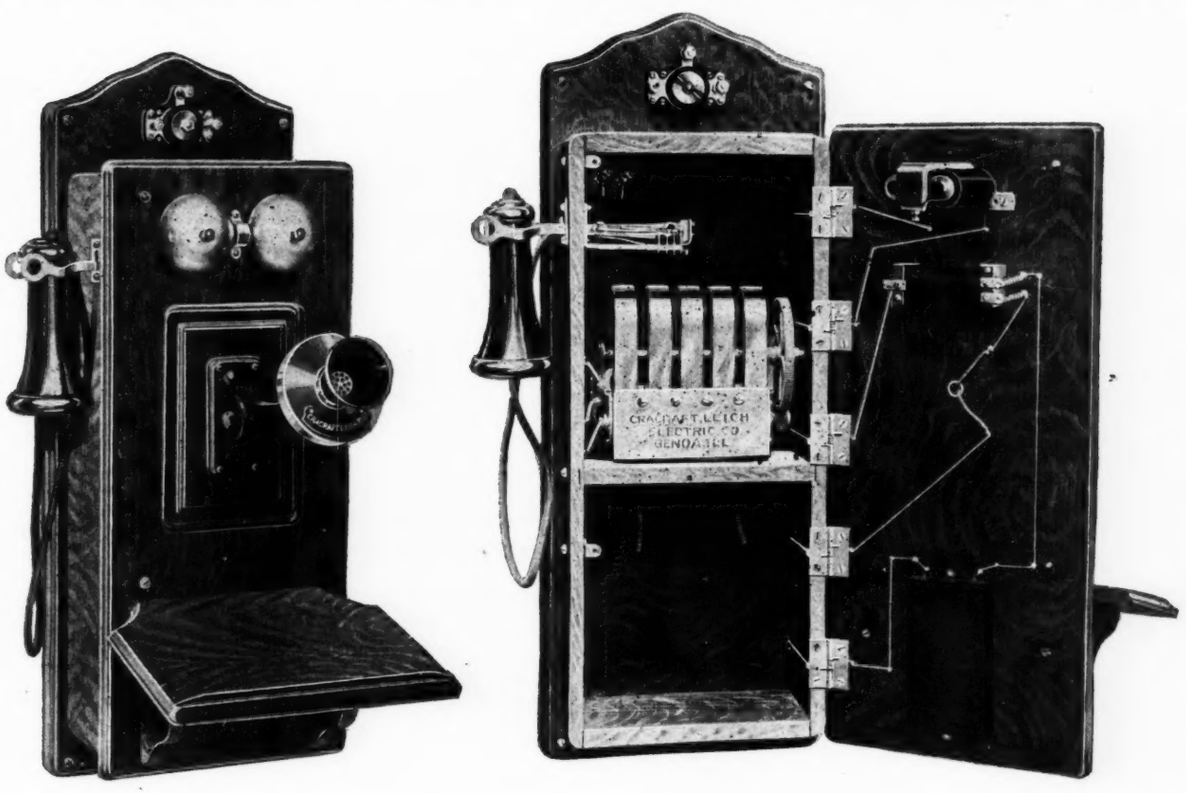
Twentieth Street and Wabash Avenue, Chicago, Ill.

TELEPHONY has led all of the successful telephone fights.

Announcement

The Cracraft-Leich Electric Co., an organization of telephone men of knowledge, experience and ability in their line, has purchased the plant, machinery and equipment of the Eureka Electric Company of Genoa, Illinois.

The plant has been entirely overhauled and enlarged. New machinery has been added, and a line of standard telephone apparatus is now being manufactured by them of the very highest quality possible to be turned out by the most modern methods backed by brains and money.



The patronage of all buyers of high grade telephone apparatus is earnestly solicited.

Cracraft-Leich Electric Co.

GENOA, ILLINOIS

TELEPHONY swears to over 10,000 circulation; TELEPHONY alone can do it.

K-E-R-I-T-E

Highest Award World's Fair, 1893

1860 TELEPHONE 1907

Highest Award World's Fair, 1893

Insulated Wires AND Cables

¶ The rigid test and continuous service of over forty years has demonstrated that KERITE does not deteriorate but improves with age, and is Unequalled for Life, Service and Durability

For All Purposes

Interior, Bridling, Distributing, Etc.
Aerial, Underground, Submarine

¶ Rubber covered telephone wire output 2,500,000 feet per week

Use KERITE For Service and for Economy

W. R. BRIXEY, New York City

Sole Manufacturer ::: 203 BROADWAY

TELEPHONY'S "sworn" circulation doubles that "claimed" by others.

"Central Energy" TRADE MARK

The Test of Time Tells

There's a lot of human nature about Desk Telephones.

Generally speaking, they all look alike — that is very nearly — nice finish and trimmings on the outside.

But a telephone is a public utility article designed **to serve your customers** years without number — and the real question is:

"What kind of service is it going to give them five years from now?"

Ask yourself that when you are selecting telephone equipment.

And if you study the matter carefully, you will surely select "Stromberg-Carlson" Desk Telephones.

For "Stromberg-Carlson" Desk Telephones are recognized everywhere as the very highest type of **quality talking apparatus,** strong and simple construction, combined with most durable and efficient parts, besides the handsomest design.

We want every exchange manager to know just how efficient and serviceable "Stromberg-Carlson" Desk Telephones are.

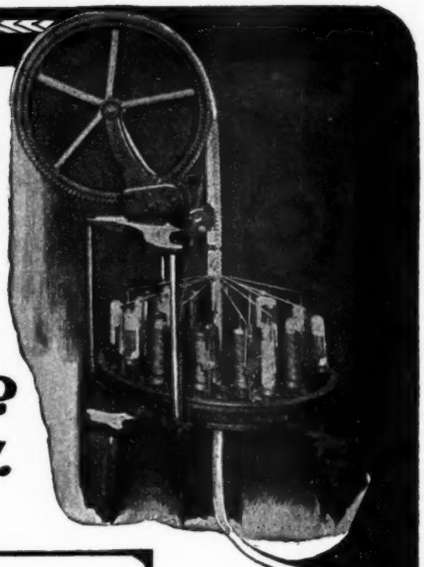
Write us for More Particulars and Prices

STROMBERG-CARLSON TEL. MFG. CO.
ROCHESTER, N.Y.-CHICAGO, ILL.

Samples of TELEPHONY'S Daily Report sent to prospective advertisers.

RUNZEL-LENZ ELECTRIC MANUFACTURING Co

97-101 S. CLINTON ST.
CHICAGO.



SOLE PREMIER MANUFACTURERS

The Only Successful Steel Cord

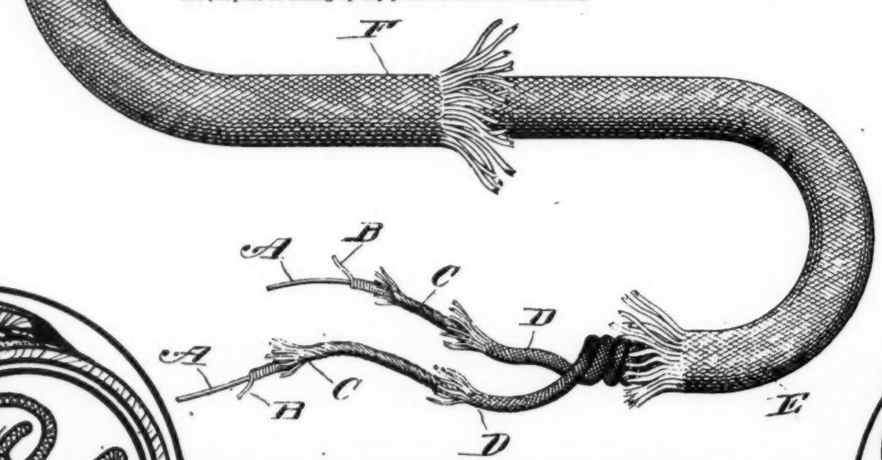
CONDUCTORS A-B are made of special prepared nard drawn steel wire, insuring flexibility and durability. Owing to the high resistance of the steel wire, a winding of copper wire is applied to reduce the resistance.

INSULATION C-D. Each conductor has a triple insulation, the first consisting of a serving of silk, the second of a serving of cotton, and the third a braiding of waxed cotton.

FORMATION. Both conductors are formed into a concentric spiral as illustrated by cut. Over the spiral is applied a braiding of cotton on the longitudinal effect for the purpose of taking up any possible stretch in the cord.

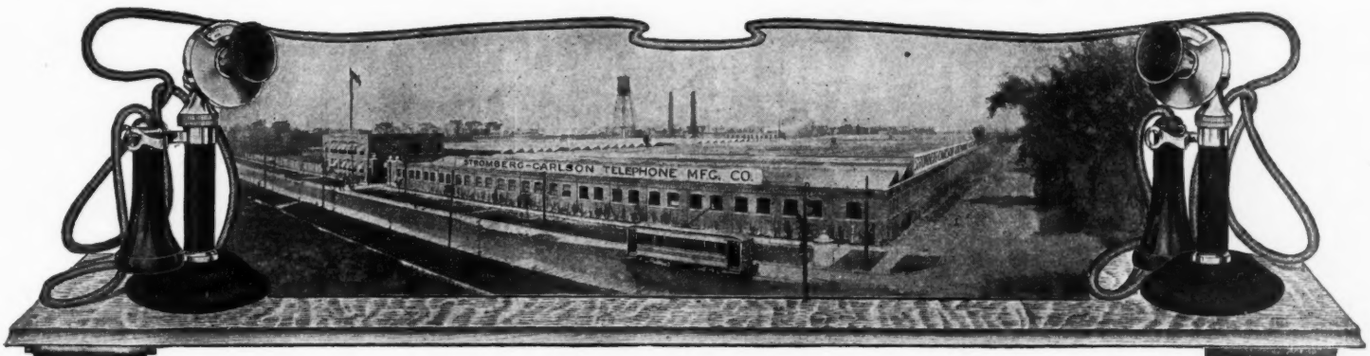
RE-ENFORCEMENT SPRING made of very high grade steel wire is inserted in the hollow of the cord at PLUG END for the purpose of doubly re-enforcing the cord at the end that is subject to the greatest usage. The spring is inserted in a manner that prevents the conductors from being thrown out of alignment, making it almost impossible to break the cord at the PLUG END—regardless of how the operator may insert or jam it into the switchboard jacks.

OVERALL BRAID—E-F. Consists of special high-graded linen thread boiled in wax. A double braiding is applied at the plug end for the re-enforcement.



Let us quote you our new prices —they're in your favor

Success consists largely in a man's staying qualities.



QUALITY MAGNET WIRE

¶ With our complete facilities for insulating fine wires we can fill any size order in any of the standard sizes promptly.

¶ A few days ago we received a telegraphic order at exactly 4:05 P. M. as follows:

"East Pittsburgh, Pa., Oct. 10, 1907.

"Stromberg-Carlson Tel. Mfg. Co.,
"Rochester, N. Y.

"Enter order 200 pounds 35 single silk covered, half express, balance freight, to Newark immediately.

"Westinghouse Electric & Mfg. Co."

¶ One hundred pounds of this wire was delivered to the express company at 5:20 P. M. the same day—1 hour and 15 minutes after the order was received. The balance was shipped as requested by freight the following day.

¶ This shipment was tested and inspected in the regular way after the order was written.

¶ White Silk Magnet Wire furnished promptly from stock.

Quality Magnet Wire in shipping case containing 56 spools of tested wire

No orders are too large to overtax our capacity or too small to receive our best attention

¶ All wire is thoroughly and uniformly annealed and must prove a conductivity of not less than 98% of pure copper. Insulated with pure boiled-off Italian silk free from **short ends, knots** or **discolored strands.**

¶ Every spool is electrically tested and inspected. All spools evenly and carefully wound. One continuous length on a spool.

¶ Each spool is marked with size of wire—gross weight—spool weight—net weight.

¶ Make a test or comparison in your own way—you will find "Stromberg-Carlson" Quality Magnet Wire is better than the ordinary commercial product.

¶ All orders, large or small, receive prompt attention.

WRITE NOW FOR PRICES TO INSURE EARLY DELIVERY

SEE OUR EXHIBIT AT THE ELECTRICAL SHOW, CHICAGO, JANUARY 13-25, 1908

SPACE NO. 7-8, SECTION L

STROMBERG-CARLSON TELEPHONE MFG. CO.

ROCHESTER, N.Y. CHICAGO, ILL.

Find a way or make one—Perhaps TELEPHONY can help you.

ELECTRIC APPLIANCE COMPANY

AMERICA'S LARGEST ELECTRICAL SUPPLY HOUSE

ESTABLISHED SIXTEEN YEARS & WE GROW A LITTLE EVERY DAY.

134-136-138-140 WEST JACKSON BOULEVARD,

CHICAGO

WHAT'S THE USE

of having to write daily to have your order rushed.

Place your order with a firm which has built up the largest supply business in the country on its ability to make "PROMPT SHIPMENTS."

Our stock is complete. You don't have to wait.

Telephones, construction material, linemen's tools, etc.

If you have not tried us, don't delay. Send us your next order and be convinced.

PARANITE

HIGH GRADE ELECTRICAL SUPPLIES

CHICAGO, SANFRANCISCO, DALLAS, NEW ORLEANS

WEATHER-PROOF TRADE MARK "O.K." LINE AND HOUSE WIRES

TELEPHONY provides every essential for covering the telephone field.

Something New

The new Century Magneto Call Switchboard is the very latest development in this class of apparatus and includes many features not found in any other make of equipment.

If you are interested in a new switchboard, write us for particulars of our type 14,—100 or 150 line switchboard.

Century Telephone Construction Co.

1738 Elmwood Ave., BUFFALO, N. Y.
408 Delaware St., KANSAS CITY, MO.

STEEL WALL SETS

No wood work is used in the construction of this common battery instrument.

No exposed metal parts enter into the circuits, and special insulation prevents trouble and obviates any opportunity of the subscriber receiving a shock.

In size—$5\frac{3}{16}$"x$8\frac{1}{2}$"—it is the smallest complete instrument manufactured. The end of the mouth piece is only $6\frac{1}{2}$" from the wall.

SEE "DEAN" BULLETIN No. 102

Metal Box Telephones

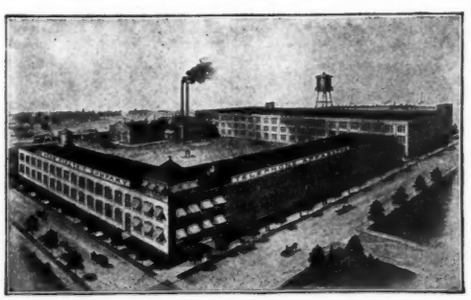
CODE NO.	*FINISH	CIRCUIT	CONDENSER	RINGER
1800	As Specified	Standard	1 M. F.	1000 ohm
835	As Specified	Standard	1 M. F.	500 ohm
740-1	As Specified	4-party	1 M. F.	No. 1 Harmonic
740-2	As Specified	4-party	1 M. F.	No. 2 Harmonic
740-3	As Specified	4-party	1 M. F.	No. 3 Harmonic
740-4	As Specified	4-party	1 M. F.	No. 4 Harmonic

LOOK FOR THESE INSTRUMENTS AT THE ELECTRICAL SHOW

An Independent Telephone Plant

This is the title of our new
BROWN BOOKLET
which contains more general information than advertising. The Dean Electric Company is mentioned only twice.

SEND FOR IT



THE DEAN ELECTRIC COMPANY
ELYRIA · OHIO

To get big results, use the big medium, TELEPHONY.

An Unusual Investment Opportunity

A SYSTEM OF RAPID AUTOMATIC TELEGRAPHY THAT TRANSMITS MESSAGES AT THE RATE OF 50 WORDS FOR 25 CENTS, ANYWHERE IN THE UNITED STATES.

The TELEPOST

AN INDEPENDENT TELEGRAPH CORPORATION, TO BE OPERATED IN CONJUNCTION WITH THE INDEPENDENT TELEPHONE COMPANIES OF AMERICA, WITH SIMULTANEOUS USE OF WIRES.

Capital Stock, $18,000,000

VOTING TRUSTEES

HON. JOHN W. GOFF, New York, Judge of the Supreme Court.
S. S. M'CLURE, New York, Editor and Founder of McClure's Magazine.
H. D. CRITCHFIELD, Milwaukee, Wis., President Milwaukee Independent Telephone Co.
F. W. SHUMAKER, New York, Treasurer Sterling Debenture Corporation.
H. LEE SELLERS, New York, Secretary R. H. Sellers Company.

DIRECTORS

CAPT. W. J. BARNETTE, U. S. N., Washington, D. C.
General Board, Navy Department.

A. K. BROWN, Chicago, Ill.
President Kenwood Trust and Savings Bank, Chicago.

JOHN M. CARRERE, New York,
Carrere & Hastings, Architects.

THOMAS CONYNGTON, New York,
Conyngton & Harrison, Attorneys.

H. D. CRITCHFIELD, Milwaukee, Wis.
President Milwaukee Independent Telephone Company.

HON. WILSON H. FAIRBANK, Warren, Mass.
Ex-State Senator, Massachusetts.

R. H. SELLERS, New York,
Secretary and Treasurer.

H. LEE SELLERS, New York,
President.

C. H. SILLIMAN, New York.
Banker.

The Telepost Company owns all the rights and patents of the Delany System of Rapid Automatic Telegraphy. After a successful, practical demonstration over a broad circuit in actual work, covering a long period, this system is now commercially perfected.

The Telepost Company is now preparing to construct its Boston-San Francisco Trunk Line. Financial arrangements are in the hands of the Sterling Debenture Corporation of New York, who are authorized to receive advance subscriptions, in small blocks only, from the Independent Telephone operators of the country.

Independent Telegraphy is the natural ally of Independent Telephony. Co-operation will assure rapid installation in all sections of the country.

The profits that will come to the original shareholders of the Telepost may be judged from the fact that, even with its greatly reduced rates, the new company will make a net profit per message three times as great as the old-time systems can make with their high rates. And this enormous profit will be distributed over an $18,000,000 capitalization, as against the $218,000,000 capitalization of the old systems.

With the unusual protection afforded to the small shareholders through the provisions of the Board of Voting Trustees, an investment in Telepost stock is as safe as a government bond, and the opportunity for subscribing is not likely to remain open long.

Write for Booklet No. 75, which contains a full prospectus for investors.

Sterling Debenture Corporation

Brunswick Building, Madison Square, NEW YORK

ROBERTS MEANS SECRET SERVICE AND MUCH MORE

The **Roberts System** is not limited to **four** or **eight** parties on a line as are other Systems. It gives **full selective secret service** with **emergency calls** with **four** or **forty stations** on a line. **The only limit is the traffic.** That's why it is sometimes called the

FORTY-PARTY SYSTEM

FORTY PARTY

FORTY PARTY

No Pawls
No Ratchets
No Delicate Adjustments
No Complication
No Divided Circuits
No Harmonics
No Mysteries

Simple
Reliable
Easy to Understand
Positive
Selective Ringing
Secret Service
Unlimited Capacity

At the last Telephone Convention eleven of these relays were each operated **125,000** times without error. They are still working.

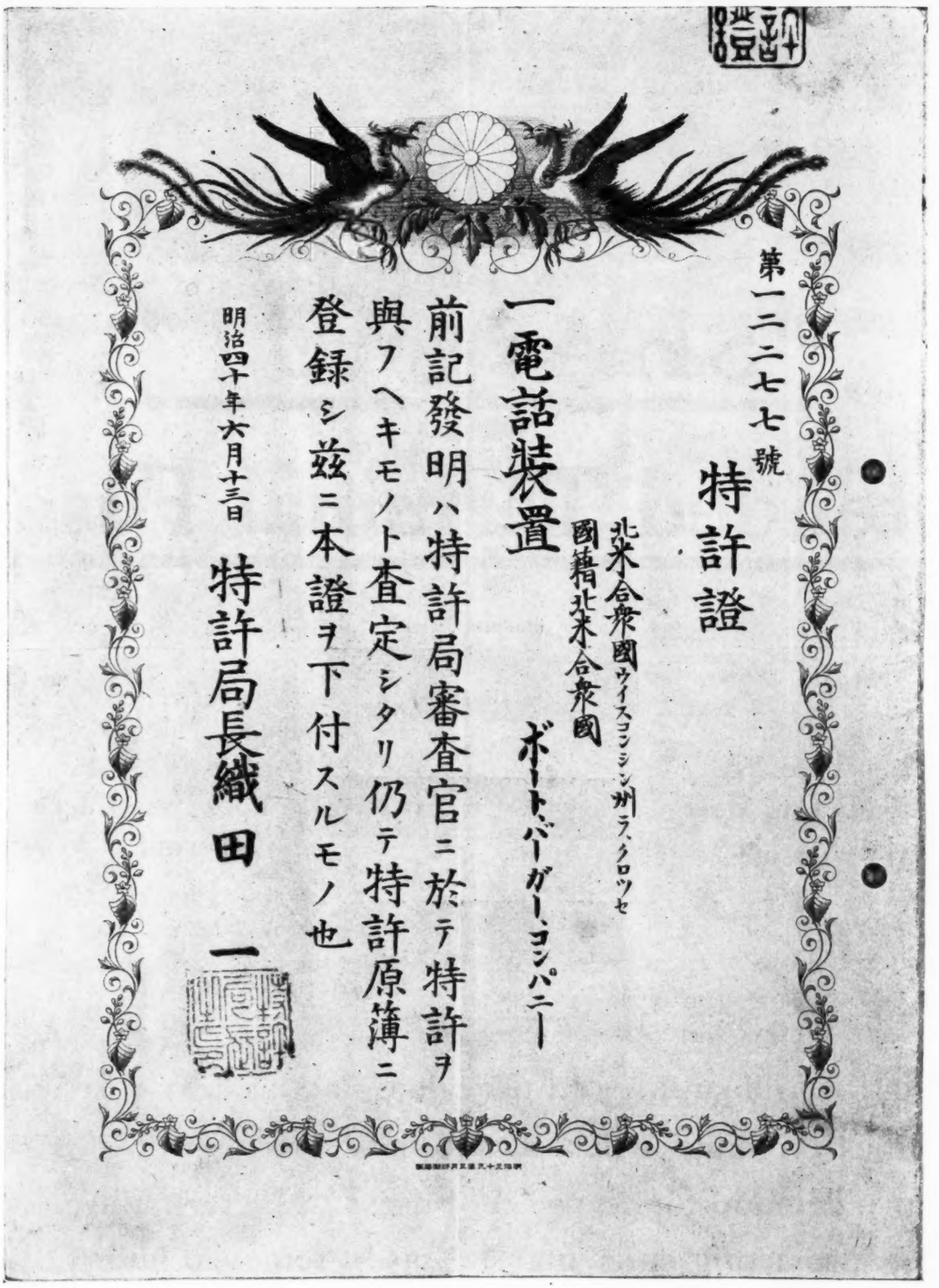
A Brand New Feature. An Impartial Party-Line System.

When a subscriber attempts to make a call and finds the line in use, he does not have to wait at the telephone until the line is free for fear someone else may get in before he does. He will be called automatically as soon as the line is free, and if more than one are waiting, each will thus be served in turn.

HOMER ROBERTS TELEPHONE CO.

1703 MELROSE ST.
CHICAGO

Business worth having is worth going after.



第一二二七七號

特許證

北米合衆國ウイスコンシン州ラ・クロッセ
國籍北米合衆國
ボート・バーガー・コンパニー

一電話裝置

前記發明ハ特許局審査官ニ於テ特許ヲ
與フヘキモノト査定シタリ仍テ特許原簿ニ
登録シ茲ニ本證ヲ下付スルモノ也

明治四十年六月十三日

特許局長織田一

THE BALLAST BOARD KNOWN THE WORLD OVER

THE VOTE-BERGER COMPANY, LA CROSSE, WISCOSNIN, HAS PATENTS UPON THE COMMON BATTERY **BALLAST** SWITCHBOARD NOT ONLY IN JAPAN, BUT IN EVERY COUNTRY ON THE GLOBE.

Do you follow up the pointers in TELEPHONY'S Daily Report?

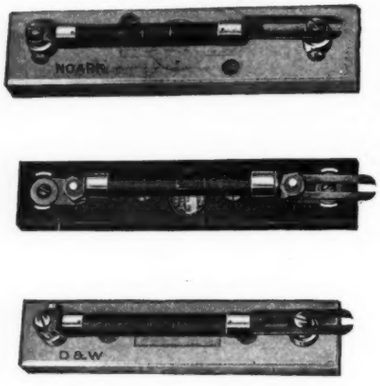
Jobbers and Supply Houses

.... HAVE YOU SEEN THE ....

"SHAWMUT"

Extended Terminal Fuses?

(Pat. Nov. 6, 1906)



Fit Any Type "A" or Screw Clamp Base on the Market

Never Mind About Your Base, the Extended Terminal Will Fit

Why keep a supply of Fuses manufactured by three or four companies on hand when a complete line of these fuses will meet any demand for Type "A" Fuses? The terminal is scored and the projecting ends may be easily removed after fitting to the base.

WRITE FOR BULLETIN AND PRICES

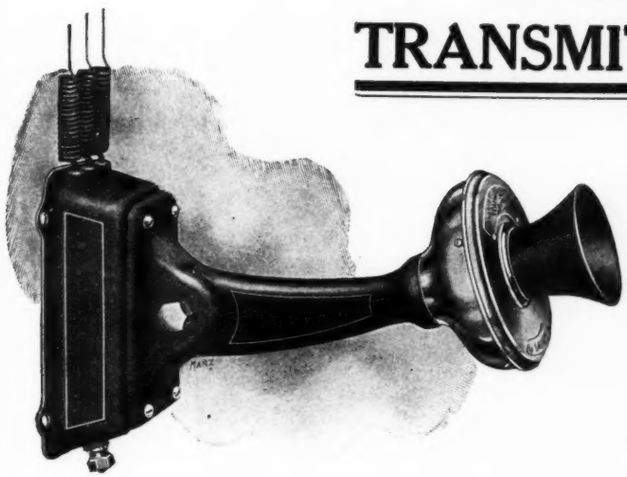
CHASE-SHAWMUT COMPANY

NEWBURYPORT ::: MASSACHUSETTS

Do just one thing better; the rest will follow.

MONARCH

TRANSMITTERS



Thousands of Monarch talking sets have been installed on old telephones of other makes, thus making the instruments serviceable, where they were practically worthless. The mountings here shown are standard and make it possible to place Monarch transmitters on almost any make of telephone. Other mountings can be furnished at slight additional cost.

If you are rebuilding any old telephones or if you are not satisfied with the service rendered by the transmitters now in use, it will pay you to secure samples and prices from us. The reputation of the Monarch Transmitter is a guarantee of its excellence. A trial will convince you that its reputation is well founded.

CATALOGUES AND PRICES SENT UPON APPLICATION.

Monarch Telephone Mfg. Co.
CHICAGO, U.S.A.

ALL TELEPHONE MEN SHOULD ATTEND

THE

ELECTRICAL SHOW

AND THE ANNUAL CONVENTION OF THE

International Independent Telephone Association

To be Held at the Coliseum, CHICAGO

January 13-25, 1908

From present indications there will be more independent telephone people attend the Electrical Exposition and the Convention than ever before in the annals of history.

All sessions of the Convention will be held in the Coliseum Annex Hall, directly above the space devoted to Telephone Exhibits.

The Coliseum, Wabash Avenue and Fifteenth Street, Chicago
Greatest Hall of the West's Greatest Metropolis

Everything Pertaining to the Telephone Business Will be Exhibited on a Magnificent Scale Attracting Those That Never Attended Before

In Order to Secure Any Space Applications Should be Made at ONCE

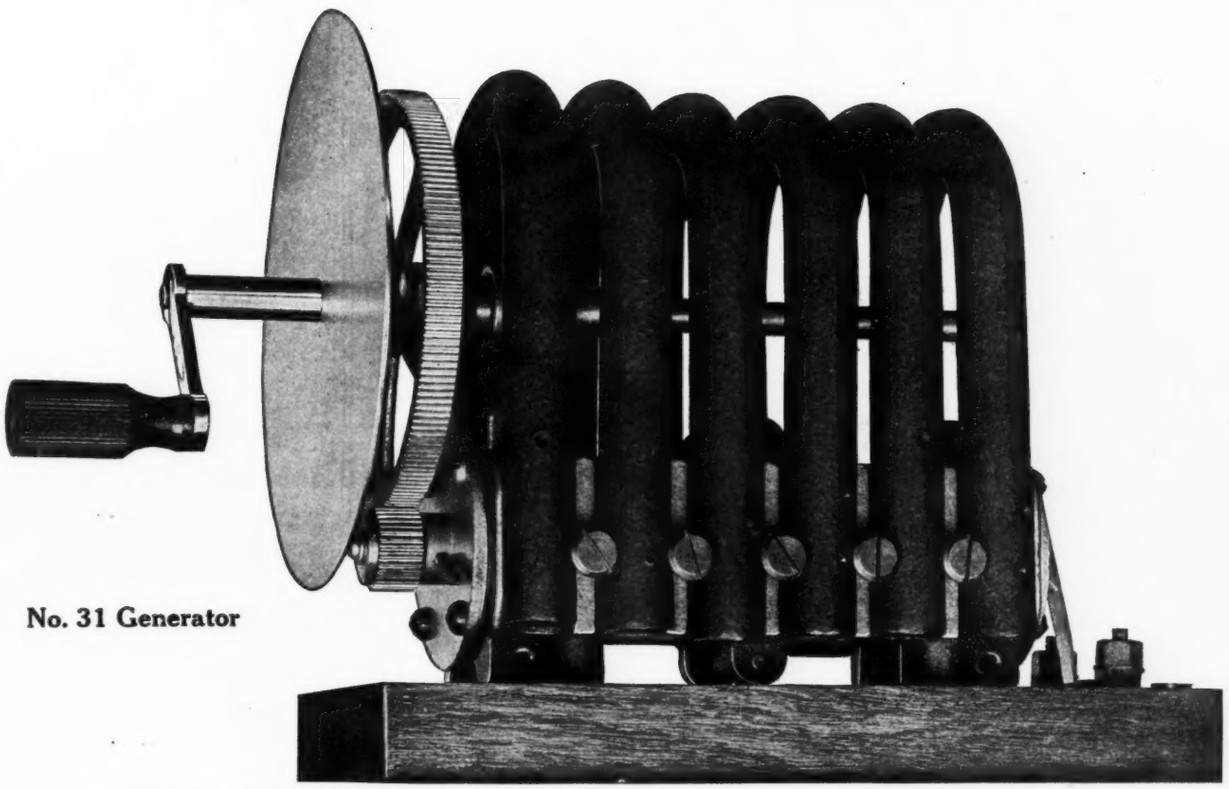
Electrical Trades Exposition Company

1006 Monadnock Block, CHICAGO

HOMER E. NIESZ, Manager

SEND FOR OUR JULY, 1907 BULLETIN

Powerful Switchboard Hand Generators



No. 31 Generator

If you find difficulty in ringing your heavily loaded lines, try one of our new Round Magnet Six-Bar Generators

A great source of annoyance in the exchange is the failure on the part of switchboard generators to perform their function of properly signaling all telephones on the heavier loaded lines. For the past year we have been furnishing our Round Magnet Generators in our bridging telephones with unequalled success.

The closer air-gap possible with the superior mechanical qualities of this generator, the close proximity of the permanent magnets to the rotating armature, the substantial bearings and accurately machine-cut gears are responsible in a large measure for the increased output which these Generators are capable of giving. We therefore, apply this same principle to the manufacture of a Round Magnet Switchboard Generator, having these heavy round magnets giving increased permanent magnetism for the armature. This, with the addition of other advantageous features, such as removable bearings, and armature without a shaft protruding through the centrally wound portion, enables us to offer a Switchboard Generator whose output is correspondingly increased.

The Switchboards which we furnish to our customers are provided with these Generators and are giving excellent results. We are making a specialty of furnishing these Generators to telephone exchanges who have not availed themselves of this powerful machine at a very moderate price.

Any further information desired regarding these Generators and their prices will be cheerfully furnished on application.

American Electric Telephone Company

State and 64th Streets, Chicago, Illinois

Gray Telephone Pay Stations

And Registers Now Carried in

CHICAGO STOCK

No. 10

The simplicity of construction of Gray Pay Stations makes them particularly desirable.

There are no levers or springs to break, stick or slow down the service. They are practically everlasting and at no maintenance expense.

They are always appreciated by the user who is required to do nothing but deposit the coin, and they allow for the most rapid service.

Your orders for any of the standard styles of Gray Pay Stations can be filled from our Chicago stock the day they are received, and at a saving in freight charges, especially if ordered with other supplies.

Write Us for Descriptive Matter Prices, Etc.

No. 13-A

ILLINOIS ELECTRIC COMPANY

239-241 MADISON STREET CHICAGO, ILL.

Standard Telephone Construction Material, Tools, Specialties, Etc.

Clement-Automanual The Epoch-Making System.

The Clement-Automanual

Is, in every sense of the term, an epoch-making invention, reduces the cost of telephone operation and assures the most efficient and satisfactory service.

The Clement-Automanual

Is not an experiment. It is perfected in every detail—a scientific and technical triumph.

The Clement-Automanual

Has no less than TWENTY-TWO POINTS OF ADVANTAGE over ANY other EXISTING SYSTEMS OF TELEPHONY, being the result of years of careful study and painstaking laboratory work.

The Clement-Automanual

Combines all the advantages of the full Automatic and the modern Manual systems and eliminates the undesirable features of both.

The Clement-Automanual

Has no widely-scattered machinery at Subscribers' stations, but performs automatically work done by Manual operators.

The Clement-Automanual

Saves from forty to eighty per cent of "A" operators; does away with "B" operators altogether; gives quick, accurate and secret service. CAN BE ADAPTED to ANY EXISTING CENTRAL ENERGY SYSTEM OF ANY VOLTAGE.

The Clement-Automanual

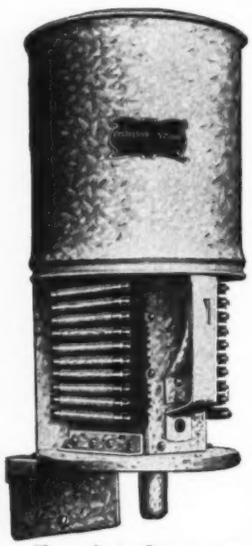
Does many other wonderful things in which every telephone manager ought to be vitally interested. If you wish to know something more about it, write

The North Electric Company

Kansas City Cleveland Dallas

Why patronize journals of unknown circulation? Stick to TELEPHONY.

Pole Cable COOK Terminals



Type S-6, Cover up

TYPE S-6
NO POT HEAD NECESSARY WITH THIS TERMINAL

This terminal combines the tubular line fuses and carbon lightning arresters. These are mounted on a sheet metal moisture-proof cable box, and are so arranged that connections are very easy of access.

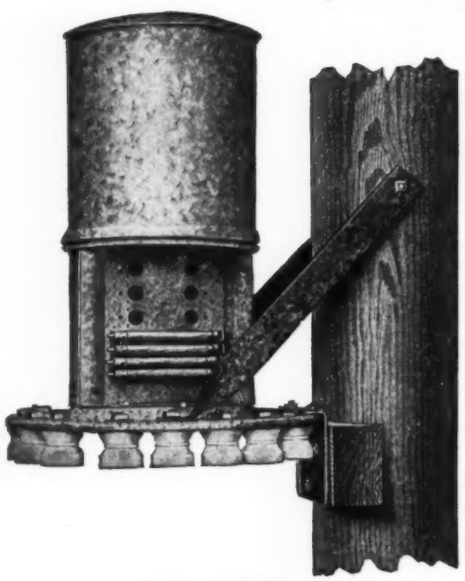
The cable is brought in through the self soldering nozzle and the conductors are fanned out and passed through hollow solder clips, where they are soldered at the end **outside** the box, the front plate or cover being removed for this purpose. The front plate is then fastened on securely, a rubber gasket rendering the joint moisture proof. This terminal is **all metal** and an improvement on the well-known Type S. W., being practically indestructible.

All sizes, 10 pairs up.

TYPE T-19
COMPLETE WITH PROTECTORS AND COVER

This terminal has the combination of tubular fuses and carbon arresters mounted on pressed steel panels which are heavily galvanized, and which are lined with fibre to insulate the pot-head wires and jumper wires from the metal. The fibre is specially treated so it will not warp or split. The protectors are arranged on individual rubber blocks and can be mounted one pair at a time. Type T-19 terminal is for use with pot-head and is equipped with Type A-7 fuses. The panels hold the cover in place. The base plate has separate holes for the pot-head wires and the jumper wires. The steel bracket is formed for mounting on the side of the pole or cross-arm.

All sizes, 10 pairs up.



T-21, (Side View)

TYPE T-21
COMPLETE WITH PROTECTORS AND COVER

Type T-21 combines the terminal and distributing ring and is fitted with bracket and braces for mounting on the side of the pole. The upright strips are heavily galvanized pressed steel panels lined with fibre to insulate the pot-head wires and jumper wires. The fibre is specially treated so it will not warp and the steel panels are very durable and cannot warp or split. The protectors are arranged on individual rubber blocks and can be mounted one pair at a time. These terminals are for use with a pot-head and Type A-7 fuses, 5 amperes standard, are used. Porcelain knobs can be attached to the distributing ring and can be added one at a time as each pair of protectors are installed. Special springs hold the cover in place. The base plate has separate holes, insulated, for the pot-head wires and the jumper wires.

Any capacity from 10 to 50 pairs.

Frank B. Cook., Mfr.

242 WEST LAKE STREET ::: CHICAGO, ILLINOIS

All advertisers, great and small, get a square deal in TELEPHONY.

A Merry Christmas

and a

Very Happy New Year

The Cut shows the Magneto Type equipped with Handmicro Telephone and Cradle Switch

await the manager who equips his lines with the "New Ericsson" all-steel telephones.

There's "Ericsson" **merit** in every one of these instruments, that **dependable** and **qualified** merit not found elsewhere.

The "New Ericsson" All-Steel Telephone

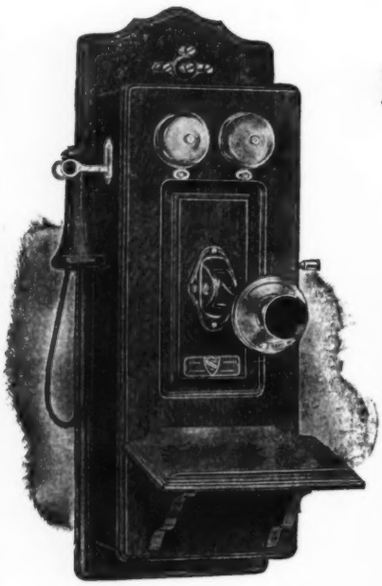
Dept. D will gladly send you our booklet "B," which deals exclusively with these new steel telephones, on request. Write for it today.

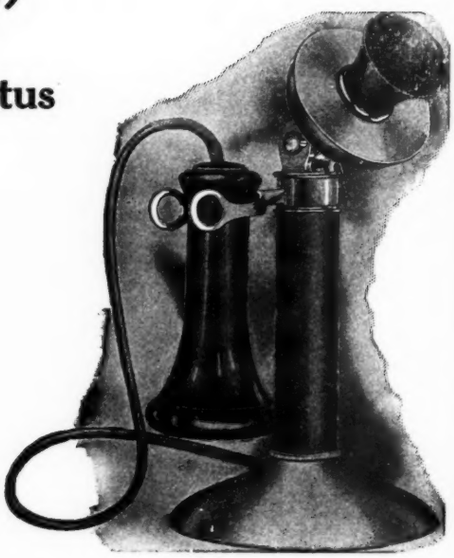
The L. M. Ericsson Telephone Mfg. Co.

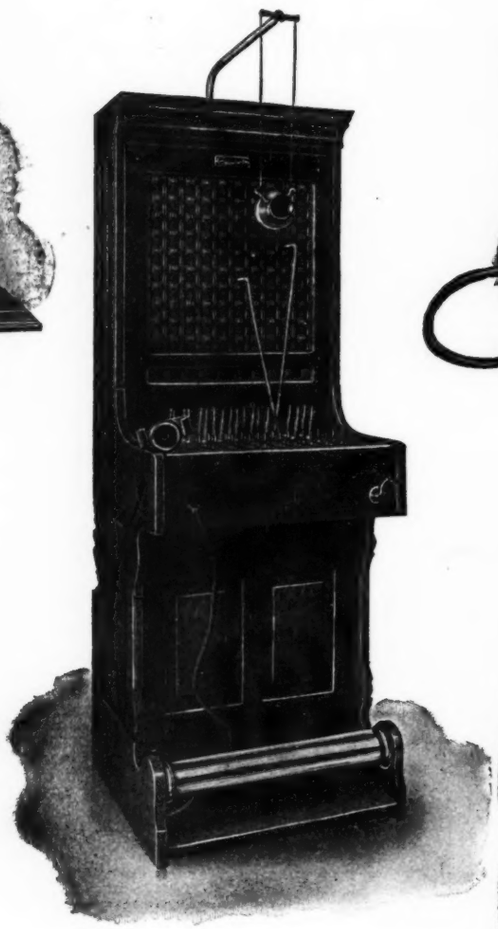
Buffalo, N. Y.

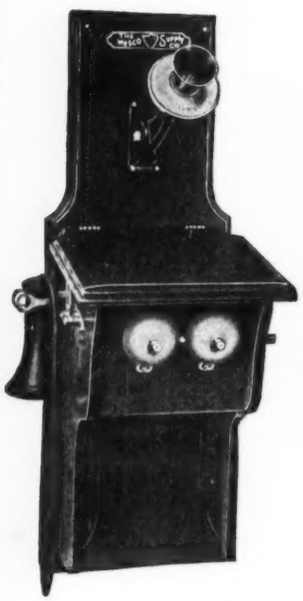
"Wesco"

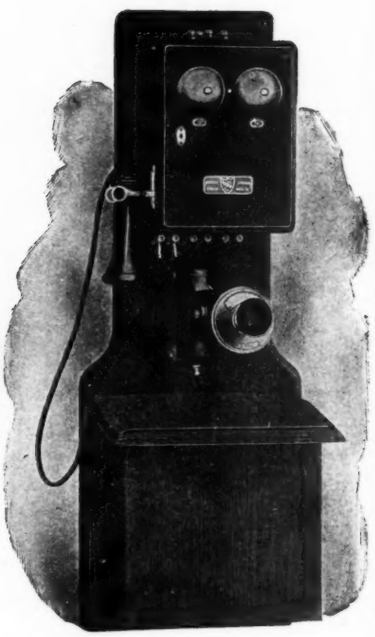
Magneto Apparatus











Has Stood the Test of Time

Write Today for Our No. 85 Bulletin
It Has Many Interesting Features

THE WESCO SUPPLY CO.

ST. LOUIS, MO. **FORT WORTH, TEX.**

TELEPHONY will suggest sales methods on request. No charge.

$67,085.00 saved

in the first cost of cable plant alone by the use of automatic equipment. That is the difference in estimates on a complete underground cable plant for manual and automatic equipment.

In a certain city of 100,000

the cable plant for a manual system would cost $200,000.00. The cable plant for an automatic system would cost $132,915.00. You may have our tabulation of these figures for the asking.

A saving of 33%

on cable plant alone is worthy of serious consideration. Couple with this the fact that there is also a saving of 40% or more on operation and maintenance expense and

The Automatic proposition

becomes something no live company can afford to pass by without investigation.

Automatic equipment has been adopted in the following cities;

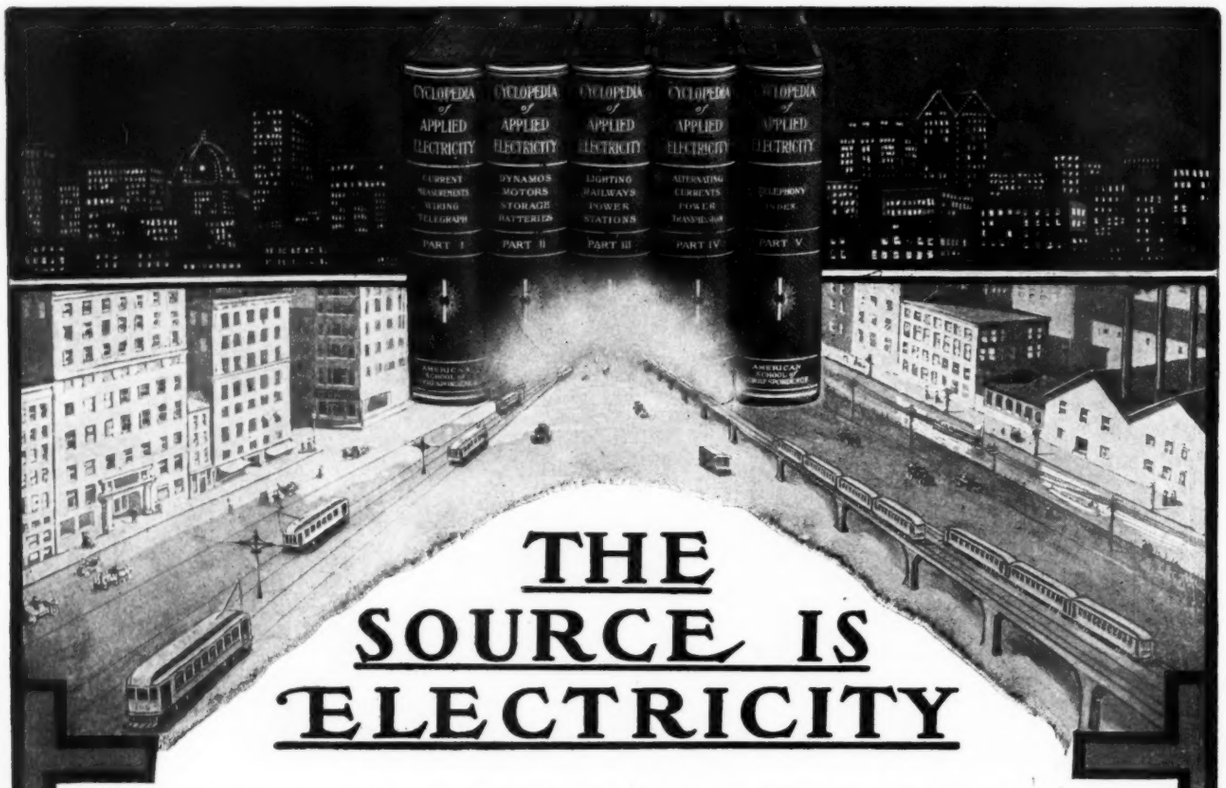
Aberdeen, South Dakota.
Akron, Ohio.
Allentown, Pennsylvania.
Auburn, Maine.
Auburn, New York.
Battle Creek, Michigan.
Beaver Falls, Pa.
Bellingham, Washington.
Berkeley, California.
Billings, Montana.
Butte, Montana.
Cadillac, Michigan.
Champaign, Illinois.
Chicago, Illinois.
Cleburne, Texas.
Columbus, Georgia.
Columbus, Ohio.
Dayton, Ohio.
Decatur, Illinois.
Denver, Colorado.
Dowagiac, Mich.
El Paso, Texas.
Emaus, Pa.
Fall River, Massachusetts.
Grand Rapids, Michigan.
Hastings, Nebraska.
Havana, Cuba.
Hazleton, Pennsylvania.
Holland, Michigan.
Hopkinsville, Kentucky.
Houston, Texas.
Jonesboro, Arkansas.
Lake Benton, Minnesota.
Lewiston, Maine.
Lincoln, Nebraska.
Los Angeles, California.
Manchester, Iowa.
Marianao, Cuba.
Marion, Indiana.
Medford, Wisconsin.
Miamisburg, Ohio.
Mount Olive, Illinois.
New Bedford, Massachusetts.
Norfolk, Nebraska.
Oakland, California.
Ocean Park, California.
Omaha, Nebraska.
Pentwater, Michigan.
Pontiac, Illinois.
Portland, Maine.
Portland, Oregon.
Princeton, New Jersey.
Richmond, Indiana.
Riverside, California.
Rochester, Penna.
Rushville, Indiana.
San Diego, California.
San Francisco, California.
Santa Monica, California.
Saskatoon, Sask., Canada.
Sioux City, Iowa.
South Bend, Indiana.
Spokane, Washington.
St. Marys, Ohio.
Tacoma, Washington.
Toronto Junction, Canada.
Traverse City, Michigan.
Urbana, Illinois.
Van Wert, Ohio.
Walla Walla, Washington.
Wausau, Wisconsin.
Westerly, R. I.
Wilmington, Delaware.
Woodstock, N. B., Can.

AUTOMATIC ELECTRIC COMPANY

Van Buren & Morgan Streets

CHICAGO, U. S. A.

You must be sure to visit our Exhibit at the Electrical Show, Coliseum, Chicago, January 13-25, 1908.
Spaces 3, 4, 5 and 6; Section L, Coliseum Annex.



THE SOURCE IS ELECTRICITY

The result is almost every comfort, convenience and luxury of modern life. Electricity has advanced the world from oil lamps, stage coaches and pony expresses, to incandescents, trolley cars and the wireless telegraph; *it will advance you* in knowledge, in opportunity, in power, if you will study it a few hours a week.

Cyclopedia of Applied Electricity

Five handsome volumes, page size 7x10 inches, 2,500 pages, 1,500 special illustrations, diagrams, formulae, etc. Bound in three-quarters morocco.

Presents in simple, compact form the latest and most practical knowledge of electricity. Explains everything pertaining to telephone work. The things which have heretofore puzzled you are here made plain. Linemen, instrument men, switchboard men, exchange men, trouble men and telephone engineers have many opportunities if they are qualified to meet them. You are given, in this work, an opportunity not only to master telephone work, but to climb still higher—to thoroughly understand electricity in all its uses. All rules and formulae are stated simply and illustrated by diagrams and practical examples. The books were written for practical men by practical men. *They contain information usually found only in the private note book of the Superintendent or Foreman.*

LESS THAN HALF PRICE

Special 30 Day Price, $14.80 **Regular List Price, $30.00**

FREE FOR INSPECTION

These books are compiled from the best instruction papers in the Electrical Engineering course of the American School of Correspondence. To make our *regular* courses known to every person interested in electricity we have made a special price of $14.80 (regular price $30.00) for 30 days, payable $2.00 within 5 days and $2.00 a month until the special price of $14.80 is paid. You can have these books in your own home for 5 days without depositing one cent. ***We employ no agents*** to annoy you. We sell you the books upon their merits, not by arguments, and we give you the benefit of the large commission usually paid to agents. We could not make such an offer if our books were not exactly as represented.

If you are interested in taking a complete electrical course, write for our FREE hand-book describing over 60 Engineering courses, including Electrical, Mechanical, Structural and Civil Engineering, Mechanical, Architectural and Structural Drafting, Telegraphy, etc.

BRIEF LIST OF CONTENTS

Telephone Instruments—Telephone Lines—Telephone Exchanges—Common Battery Systems—Telephone Operation—Telephone Systems—Telephone Maintenance—Automatic Telephone—Wireless Telephony—Electric Wiring—A Modern Central Station Design—The Alternator—The Transformer—Switchboard and Station Appliances—Power Transmission—Mercury Vapor Convertor—Elements of Electricity—The Electric Current—Electrical Measurements—Electric Telegraph—Wireless Telegraph—The Telautograph—Insulators—Electric Welding—Direct Current Dynamos—Types of Dynamos—Electric Machinery—Direct Current Motors—Electric Motors—Storage Batteries—Electric Lighting—Electric Railways—Management of Dynamo Electric Machinery—Power Stations.

American School of Correspondence
CHICAGO

COUPON
Cut on dotted line

Telephony
12-07

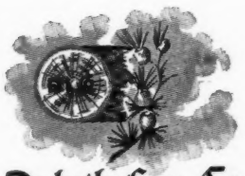
AMERICAN SCHOOL OF CORRESPONDENCE

Please send set Cyclopedia Applied Electricity for 5 days' free examinaton. I will send $2.00 within 5 days and $2.00 a month until $14.80 is paid; otherwise I will notify you to send for the books.

Name.....

Address .....

Describe your proposition; ask us how to get results.



Duluth Log Co.

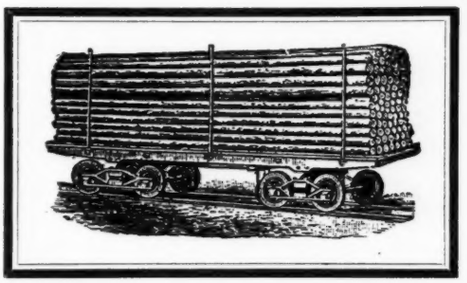
IMMEDIATE SHIPMENTS

Duluth Log Co.

THE BEST STOCK OF

CEDAR POLES

Which We Have Ever Produced



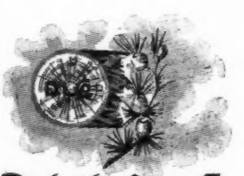
Very Reasonable Delivered Prices for Prompt Shipment.

Many Orders Filled Same Day Received and Early Deliveries Secured.

DULUTH LOG CO.

DULUTH, MINN.

General Offices: Second Floor Palladio Bldg.

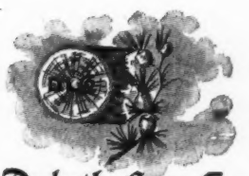


Duluth Log Co.

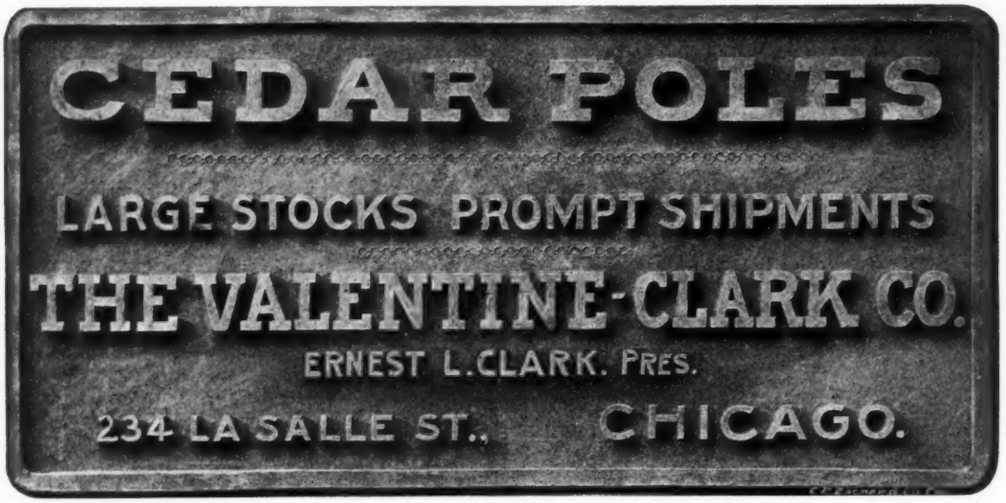
PRINCIPAL CEDAR YARDS AT

Duluth, Minn.; Hawthorne, Wis.; Washburn, Wis.; Aitkin, Minn.; Laporte, Northome, Durrin's Spur, Duluth Spur and Big Falls, besides other various yards and concentrating points throughout the northwest.

YOU GET THE BENEFIT OF THE BEST POSSIBLE FREIGHT RATES



Duluth Log Co.



White Cedar Poles

We have a large stock of all sizes from 14 feet to 65 feet.

Shipments made promptly from Deer River, Cohassett or Beaudette, Minn.

We are producers and can save you jobbers' profits.

Write us for delivered prices

ITASCA CEDAR CO.

Deer River **Minnesota**

Specimen pages from TELEPHONY'S Mailing List sent upon request.

CEDAR POLES

LARGE BUTTS

We cut poles from lands owned by our Company in Northern Michigan on Lake Superior Shore, where the cedar is very **sound** and **stocky** with **heavy butts.**
All sizes in stock all the year round.

Write for a Copy of Our Telegraph Code for Cedar Products Giving Valuable Information About Poles.

C. H. WORCESTER CO.

1708-1710-1712 Tribune Bldg., Chicago, Ill., U. S. A.

"DE-LIGHTED" THAT'S WHAT THEY ALL SAY ABOUT OUR CEDAR TELEPHONE POLES

Thoroughly Seasoned
Any Length or Size
Immediate Shipments
Seven Distributing Yards

We have a very fine stock of
20 foot—4 inch; 20 foot—5 inch
25 foot—4 inch; 25 foot—5 inch

poles, produced on our own lands in the Lake Superior district, on which we are offering close prices. Everybody knows the best cedar grows there. Send us a trial order and see for yourselves.

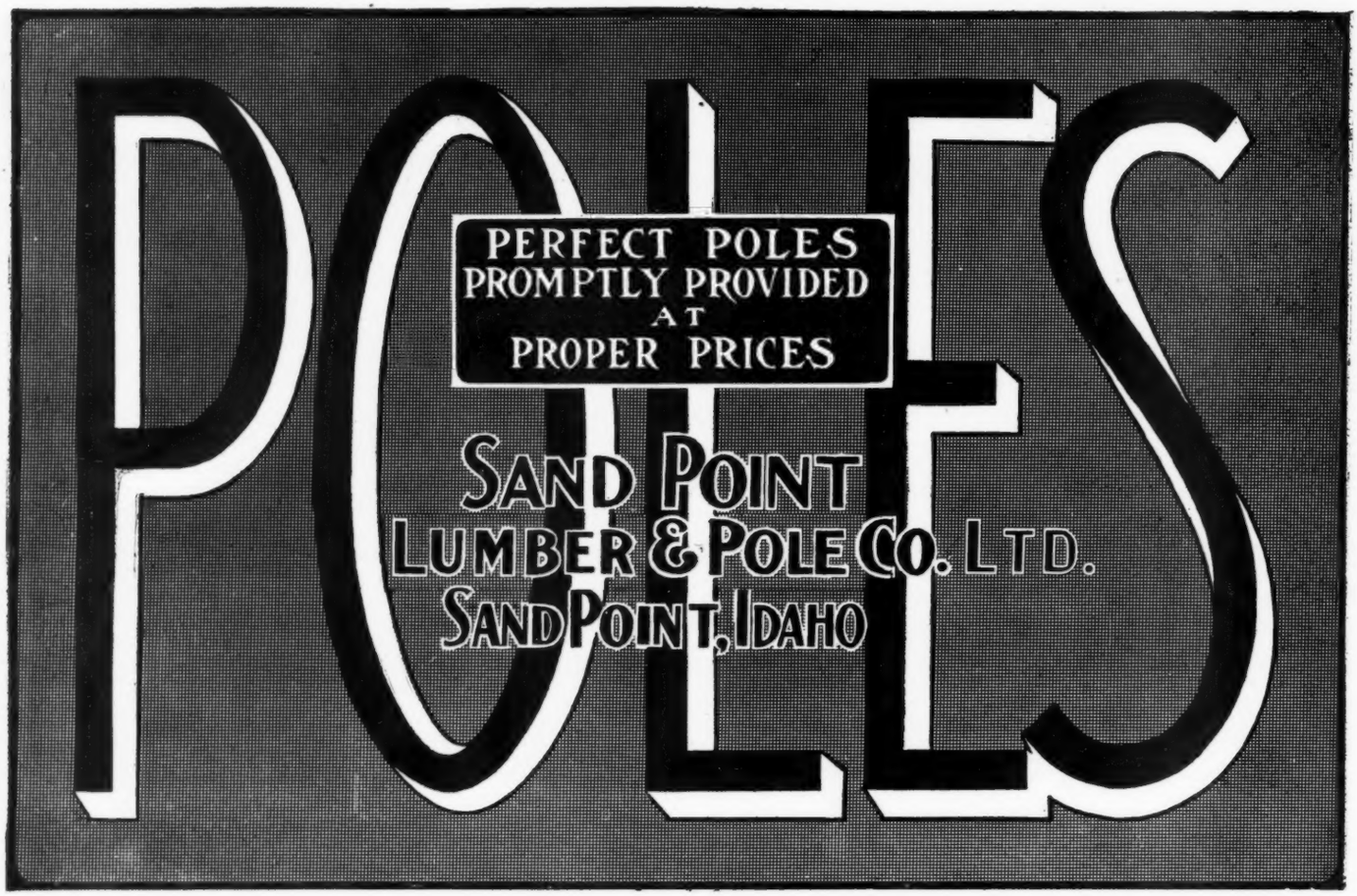
We are
Producers of White Cedar Poles, Shingles, Posts and Ties.

Address all orders, inquiries, etc.

Wm. Mueller Company, MAIN OFFICE BLANEY, MICHIGAN

Established 1862

Age, size, contents, circulation, patronage—TELEPHONY has all.



In our CHICAGO YARD available
for RUSH SHIPMENTS

We are carrying an IMMENSE STOCK of

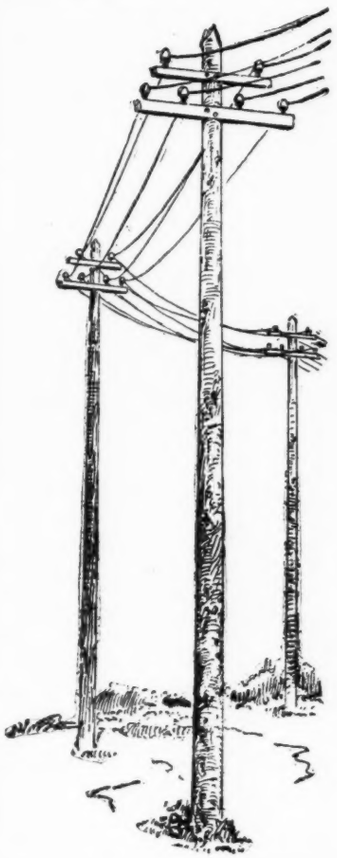
POLES AND TIES

WRITE US FOR DELIVERED PRICES

NAUGLE POLE AND TIE COMPANY

Chicago Office, 226 La Salle Street

Don't you need a good list to circularize from? TELEPHONY'S is best.



National Pole Company

ESCANABA, MICHIGAN

Successor to the Cedar Department of the

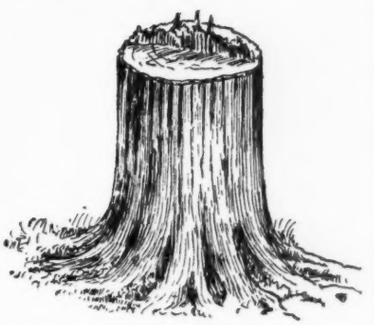
Pittsburg & Lake Superior Iron Co.

Producers and Shippers of

CEDAR POLES

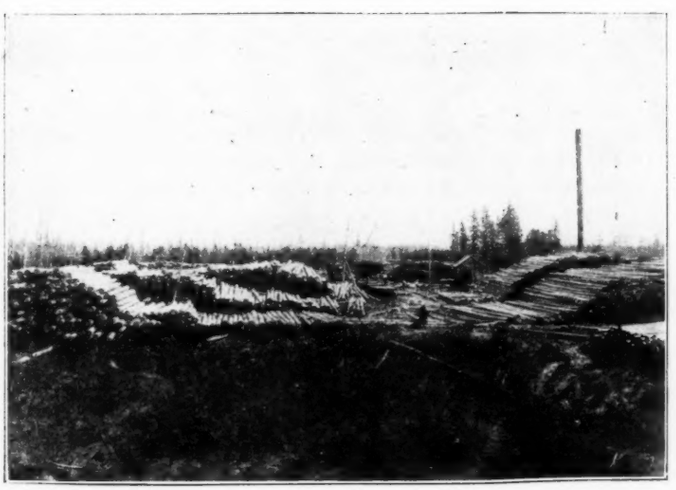
From the Stump to the Line

We carry large stocks of Poles at various points in the States of Michigan, Wisconsin, Minnesota, Idaho, Washington and Maine, and are in position to make immediate shipments at lowest prices and freight rates.



"FROM FOREST TO CONSUMER."

CEDAR POLES



All Sizes **Large Stock**

Low Prices

Prompt Shipments

LONG POLES A SPECIALTY

WRITE FOR PRICES

The Humbird Lumber Co., Ltd.

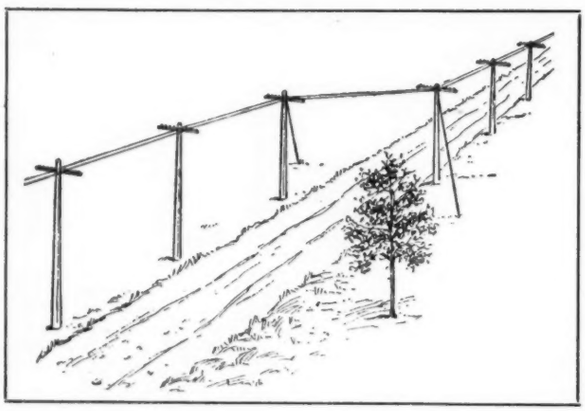
SAND POINT, IDAHO

CEDAR POLES

RABER & WATSON

Old Colony Building
Chicago

Yards at Chicago, Ill., Menominee and Cheboygan, Mich.



Find the Trouble

Every mile of this line looks just like this, not a cross, not a ground, not a tree touching the wire. There are 16 telephones on the line and three of them complain that they cannot get Central. Sometimes their rings go through all right and at others they can get no response. A first-class trouble man has been over the line several times. Every instrument is in good condition, every lightning arrester is clean and not one indication of trouble can be found. Everything is clear at the switchboard. All three generators are strong and connected up properly. Investigation has shown that the three subscribers are telling the truth.

The following Prizes will be given to managers sending us a correct solution of the foregoing trouble and correctly prescribing the remedy:

First Five correct solutions each, 1 Andrae Pocket Ammeter.
Second " " " " 1 Pair 7-in, Nickel Plated Pliers.
Third " " " " 1 Copy Dobbs' Practical Features of Telephone Work.
All others 1 copy Hyde's Telephone Troubles and How to Find Them.

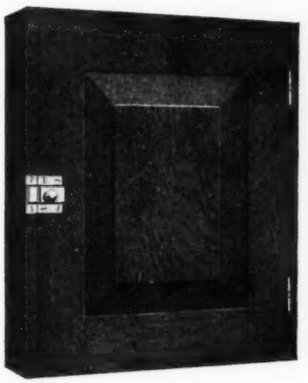
CONDITIONS: Each answer must give the name of the Company and its officers, and also a list of instruments and supplies for which the Company is in the market.

JULIUS ANDRAE & SONS CO., 217 West Water St., MILWAUKEE, WIS.

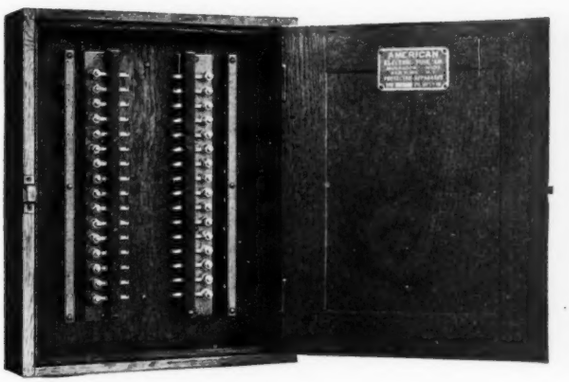
AMERICAN BUILDING TERMINAL BOX

Made in golden oak or special finish when requested. It is equipped with bronze catch and heavy brass hinges. Finished in two coats of best varnish. Ends dovetailed and glued. Solder clips made of German silver set in hard rubber. Guide wire strips of maple boiled in linseed oil. It is handy, convenient and substantial. The only one made in the independent field.

SALES FOR 3 MONTHS, 1,892 BOXES. HOW'S THAT



TRY A TYPE **L**



10 Pair, 12x12 1-4x3; 15 Pair, 16x12 1-4x3; 25 Pair, 22 5-8x12 1-4x3.
These are outside dimensions. Each box is equipped with an extra pair.

AMERICAN ELECTRIC FUSE COMPANY

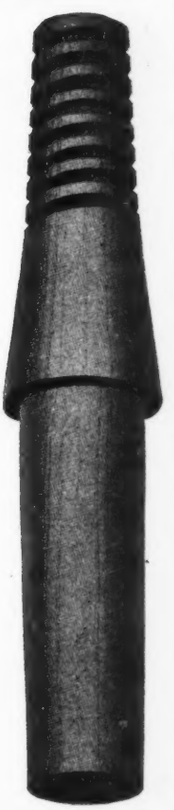
MUSKEGON, MICH. NEW YORK, N. Y.

1,000,000

Celebrated

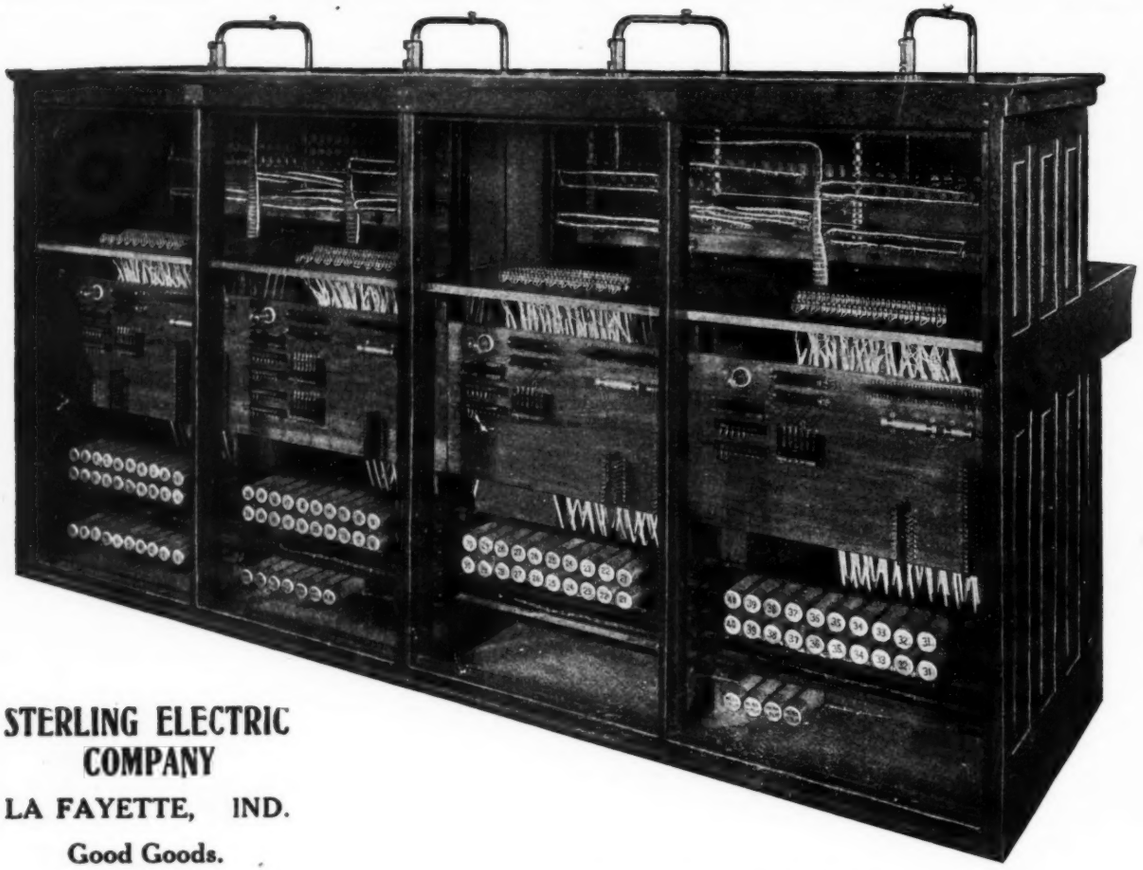
KALKEEN PINS

Carried in Stock



Oshkosh Logging Tool Co.

OSHKOSH, WIS.



TOLL DESKS

MAIN EXCHANGE EQUIPMENT

LOCAL BATTERY

STERLING ELECTRIC COMPANY

LA FAYETTE, IND.

Good Goods.

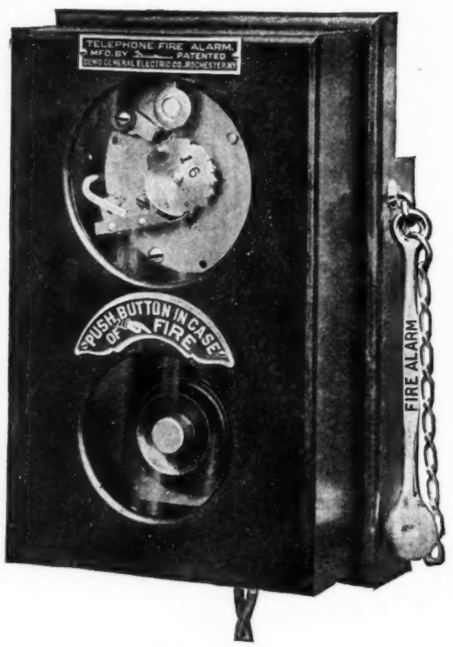
4-POSITION TOLL BOARD, REAR.

Denio General Electric Company

Telephone Fire Alarm System

For the House, Store or Factory

For EFFICIENCY and REVENUE it is pronounced the best by-product ever devised for telephone circuits. Affords complete fire protection to telephone subscribers at a minimum cost.



No. 2, Manual Box

Simple, Practical, Remunerative

An Ideal System for Small Towns and Cities

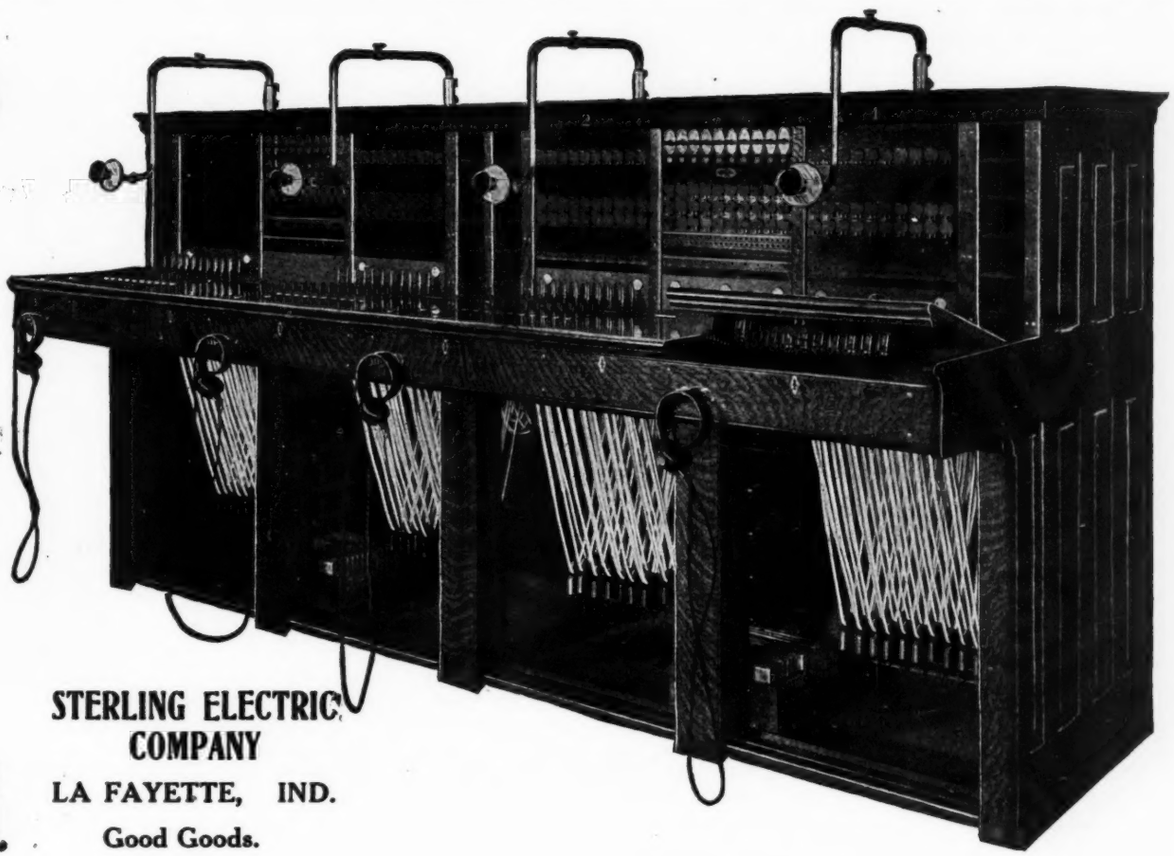
For the TELEPHONE COMPANIES there is no trouble or expense. At the same time it produces a revenue for service now furnished free.

Write for Details of Proposition to **Denio General Electric Company, Rochester, N. Y.**

BRANCH EXCHANGES

SPECIAL BOARDS

COMMON BATTERY



STERLING ELECTRIC COMPANY

LA FAYETTE, IND.

Good Goods.

4-POSITION TOLL BOARD, FRONT PANELS REMOVED.

Junction and Splicing Boxes

MOON

Combination Terminals

...ALSO...

Junction and Splicing Boxes

With Self Soldering Nozzles

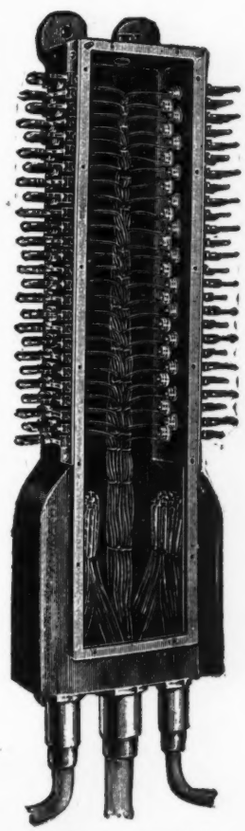
¶ It is a matter of great economy to install cable with Combination Terminals and Junction Boxes which form reliable joints and which may be readily opened should it become necessary to test your cable or inspect your splices.

¶ Trouble is easily located and splices kept in perfect condition by using Moon Combination Terminal apparatus, especially adapted for multiple Tap distribution.

WRITE FOR CATALOG AND PRICES

MOON MFG. CO.

47-49 S. Canal St CHICAGO



Combination Terminal

TELEPHONY is the only telephone medium swearing to its circulation.

THE STANDARD
"HEMINGRAY"

ALL WITH THE "PATENT DRIP PETTICOATS"

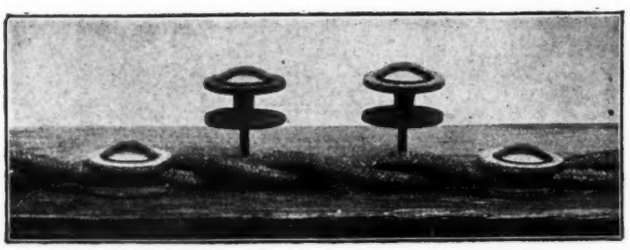
THE HEMINGRAY-GLASS COMPANY

Office, COVINGTON, KY. ESTABLISHED 1848 Factory, MUNCIE, IND.

EUREKA!

FIBER INSULATORS

'Tis But to Build Better, Sir



By their use an inexperienced wire man cannot injure insulation.

Tacks GOOD, Staples BETTER, Eureka Fiber Insulators BEST

The long desired article to fasten interior telephone wires. Prices and samples on application.

Commercial Electrical Supply Company

ST. LOUIS, MO.

Type H Protectors Sold Since July 1st

Detroit, Mich.,	Main	Office	Columbus, Ohio
"	"	North "	Des Moines, Iowa
"	"	East "	Crawford, Nebr.
"	"	Field "	Ocala, Fla.
"	"	Dell "	

Holland, Mich.
Leavenworth, Kas.
Erie, Pa.
Newport, Utah
Malone, Texas
Dell Rapids, S. D.
Leesville, La.
Burlington, Iowa
Keokuk, Iowa
Reed City, Mich.
Mt. Vernon, Ohio
Creighton, Nebr.

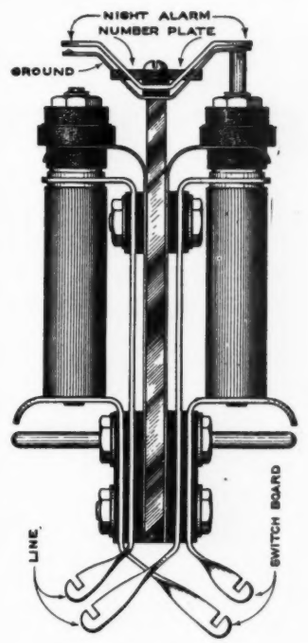
Hastings, Minn.
Dowagiac, Mich.
Onaway, Mich.
Waynesburg, Pa.
Minot, N. D.
Moberly, Mo.

Madison, Ind.
Ashley, Ind.
Atoka, Tenn.
Enid, Miss.
Nazareth, Pa.
ShelbourneFalls,Pa.

On Toll Boards as follows:

Cleveland, Ohio.
Piqua, Ohio

Marysville, Ohio
Elyria, Ohio



AMERICAN TYPE "H" PROTECTOR
TOP VIEW

American Electric Fuse Co., Muskegon, Mich. New York, N. Y.

UNIVERSAL CABLE GRIPS

HAVE YOU TRIED 'EM?

ALL USERS OF ANY OTHER TYPE OF CABLE GRIP WILL BE PROSECUTED.

It Takes Pull NOW-A-DAYS TO GET ALONG, BUT **Merit Counts**

THERE IS NO END OF PULL IN **Universal Grips** They Hold Their Own On Merit Alone.

Pat'd Oct 2, 1906.
Patent Nos. 832401 832343

UNIVERSAL CABLE GRIP CO., SYRACUSE NEW YORK

Western Agents: ILLINOIS ELECTRIC CO., 239-241 Madison St., Chicago, Ill.

Half-hearted advertising never paid anyone.

GRAY PAY STATIONS PAY

WHY?

NO LEVERS TO PULL INSURES RAPID SERVICE
NO SPRINGS TO DEPEND ON INSURES RELIABILITY OF ACTION
NO MOVABLE PARTS OR AIR PUMPS INSURES LOW MAINTENANCE
SIMPLICITY INSURES SATISFACTION TO BOTH USER AND OPERATOR

"THE ORIGINAL GRAY."

OUR 1907 CATALOGUE
Containing the Indorsements of All Leading Tel. Cos. Mailed Upon Request

GRAY TEL. PAY STA. CO.
HARTFORD, CONN.

THE IMITATORS' WAY.

Corwin Automatic Inter-Communicating Telephone System

Type E

COMMON BATTERY
WALL TYPE
CABINET
No. 77-E

CLOSED VIEW

Retains the advantage of the writing shelf.
Has long adjustable transmitter arm.
Key mounted on the shelf in most convenient position.

OPEN VIEW

This system does away with Jacks, Plugs and Cords, replacing them with a single button for each line at each telephone. Simplifies circuit connection. Avoids breakage of cords, short circuiting and poor connections. Has a combined ringing and talking key, which will stand continual wear. Mechanical action positive. Electrical contacts absolutely reliable.

Avoids confusion and economizes time and expense.

Send for Bulletin No. 1

CORWIN TELEPHONE MANUFACTURING CO.
147 South Clinton Street :: CHICAGO, U. S. A.

There is nothing stronger than the simple truth.

MERICO MERICO MERICO

MERICO MERICO

AN IDEAL SOLDERING PASTE
NOT A CHEAP GREASE

For all kinds of work requiring a Flux. **Used in Germany for years.**

CONTAINS

NO ACIDS
NO DIRT
NO WATER

WILL NOT CORRODE

Put up in Handy Tins

2 OZ., 10c
8 OZ., 20c
16 OZ., 35c

MERICO MERICO

BETTER THAN THE KIND YOU THOUGHT WAS BEST

ORDER A TRIAL LOT

American Electric Fuse Co.
MUSKEGON, MICH. NEW YORK, N. Y.

MERICO MERICO MERICO

WESTON Electrical Instrument Co.

WESTON STANDARD PORTABLE DIRECT-READING

Voltmeters and Wattmeters

Weston Standard Portable Direct-Reading Wattmeter Model 16

For ALTERNATING and DIRECT CURRENT CIRCUITS

Millivoltmeters, Voltammeters, Ammeters, Milammeters, Ground Detectors and Circuit Testers, Ohmmeters, Portable Galvanometers.

Weston Round Pattern Station Ammeter. Model 57

Our Portable Instruments are recognized as the **Standard** the world over. Our **Station Voltmeters** and **Ammeters** are unsurpassed in point of extreme accuracy and lowest consumption of energy. Write us regarding special Voltmeters with very high resistance, particularly adapted for cable testing.

Main Office and Works: Waverly Park, NEWARK, N. J.

New York Office, 74 Cortlandt Street

LONDON BRANCH—Audrey House, Ely Place, Holborn. **PARIS, FRANCE—E. H. Cadiot, 12 Rue St. George**
BERLIN—European Weston Electrical Instrument Co., Ltd., Ritterstrasse, No. 88.

Mix brains with enthusiasm and it will go farther.

Orangeburg Fibre Conduit

has the qualities most wanted in modern conduit installation: ease of laying, durability and very high insulating properties.

Manufactured from wood pulp wrapped in thin wet layers upon a mandrel till practically homogeneous; and, after drying, impregnated with an insulating compound.

Made in Socket-joint, Sleeve-joint and Screw-joint types.

Owing to the simplicity of the connections, Orangeburg Fibre Conduit can be laid with twice the speed of other types of conduit.

It is recognized that 90 per cent. of underground conduit troubles is due directly to injury or lack of protection to the lead casing of the cable. Orangeburg Fibre Conduit entirely eliminates trouble from these causes, as the nature of the material itself prevents the possibility of abrasion to the cables when being drawn in, and its high insulating qualities afford the best possible protection.

As regards its insulation, experiments have shown that the breakdown voltage of Orangeburg Fibre Conduit is largely over 25,000 volts, alternating.

As Orangeburg Fibre Conduit is so much lighter than tile conduit, transportation and cartage expense is but one-seventh of the usual cost. And there is the further economy of labor in handling.

Write for the Conduit Book.

The Fibre Conduit Company
Orangeburg, N. Y.

Boston Office, 110 State Street
Chicago Office, 1760 Monadnock Building
Pierson, Roeding & Co., San Francisco, Cal.; Los Angeles, Cal.; Seattle, Washington.
McCleary-Jemison Co.,—Birmingham, Ala.

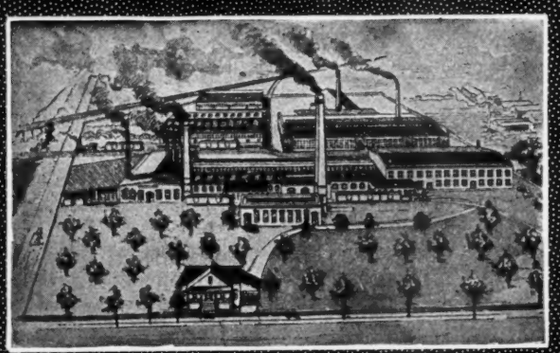
TELEPHONE WIRE

Made Expressly For
Telephone Work

Longest Life
Highest Efficiency

"Best By Every Test"

—and we can prove it



"A difference in wire makes a difference in service"

If your dealer doesn't handle our wire, write us direct.

Our circular matter tells some things every buyer ought to know

Indiana Steel & Wire Company

MUNCIE, INDIANA

CABLE COMPOUND

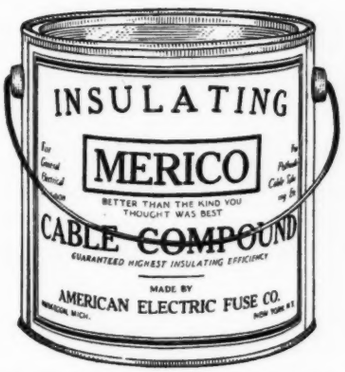
Insist on Having Merico Cable Compound

THE BEST YET. GUARANTEED HIGHEST INSULATION.

CABLE COMPOUND

IT IS IMPERVIOUS TO MOISTURE

WILL NOT CORRODE



FOR POTHEADS, CABLE SPLICING, ETC.

WILL NOT FREEZE OR CRACK

CABLE COMPOUND

RETAINS ITS ELASTICITY FOREVER.

American Electric Fuse Co.

MUSKEGON, MICH. NEW YORK, N. Y.

CABLE COMPOUND

"INTERNATIONAL" INDEPENDENTS

Increase Your Revenue

By transmitting concerts and other entertainment to moving picture shows, skating rinks, dance halls and other amusement places.

Long Distance Cornet.

Transmitters that stand this will certainly last a long time on ordinary telephone work.

Chariton, Iowa, April 28th, 1907.

International Telephone Co., Chicago, Ill.

Gentlemen:—Some time ago we bought of you through Mr. Harding of this place, receiver and transmitter which we have been using with very good results. We have wires running from our store across the street into band stand in park, and give music from phonograph or piano. The traveling men have advertised us a great deal and we have inquiries from several parts of state inquiring about it. Had a long distance phone call yesterday about it. How do you dispose of them? Could you manage to give us some territory? We certainly have the dealers coming for them, so far I have given them your address. You will no doubt see a write up in the Phonograph World this month about our store and your instrument. The Columbia Representative said he came to teach us something but we had taught him something. Hoping to hear from you by return mail, we are,

Yours respectfully,
HOBSON JEWELRY & MUSIC CO.

We manufacture Telephones and Switchboards of the very highest grade, and our prices are right.

INTERNATIONAL Telephone Mfg. Co.

Harrison and Clinton Sts. Chicago, U. S. A.

JUST WHAT YOU HAVE BEEN LOOKING FOR

THE W. U. STEEL BRACKET THE W. U. STEEL PIN

We carry a large stock of each.

An absolutely uniform bracket on which all glass insulators will fit. It is made up of a rolled steel section half oval and reinforced where shaped into the round shank that takes on the wooden block. It can be put on with lag screws and removed when poles are armed without breakage of the bracket. The breaking off of wooden brackets causes the greatest damage during a storm. The W. U. Steel bracket cannot be broken in this way. They have an insulation nearly double that of wooden brackets. The initial cost is more—**but do you consider your maintenance expense?**

Especially interesting to construction men, owing to the advanced prices and scarcity of locust pins. It has been adopted as the standard by the Western Union and Postal Telegraph Companies, and is made accordingly to their specifications. Highly carbonized steel is used, giving it great strength and stiffness. This steel pin requires a hole with a ½-inch diameter, as against 1½-inch hole required by the wooden pin. This strengthens instead of weakening the cross arm.

OKONITE IT NEVER DISAPPOINTS

Central Electric Company, ELECTRICAL SUPPLIES

264-266-268-270 FIFTH AVENUE, CHICAGO

Unitype Switchboards

Embody

Durability Accessibility Simplicity

And Every Necessary Feature for Successful Operation

NO Springs **NO Double Windings**
NO Extra Jack Contacts **NO Small Complicated Parts**
NO Trouble

SEND FOR BULLETINS

THE SUMTER TEL. MFG. CO.

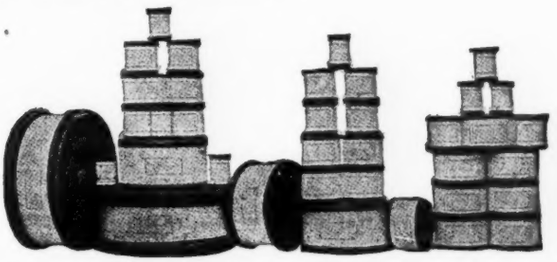
SUMTER, S. C., U. S. A.

"Be sure you're right, then go ahead"—Select the right medium.

Belden Silk Magnet Wire

is wound ONE PIECE ONLY per spool. It therefore makes windings with a minimum of splices, labor and waste.

BELDEN WIRE is accurately gauged and insulated with perfect uniformity and continuity. Therefor coils wound with equal turns will have equal resistances.



We solicit your small orders for repair and experimental work, and fill such orders promptly, cheerfully and at the right prices. To large users our large stock will appeal. We carry the largest and most complete stock of Copper Magnet and German Silver wire in the west and can usually fill any order on the day it is received. Try us and be convinced.

BELDEN MANUFACTURING COMPANY

194 Michigan Street : : : CHICAGO

SHIELD EMBLEM PLAYING CARDS FREE

To Our Customers

One pack only to each address, postage paid, on mentioning this paper and enclosing an order for telephone materials or apparatus.

Additional packs at cost to popularize the Independent Shield.

The Gray Automatic Pay Stations

FROM ST. LOUIS OR DALLAS STOCK

IMMEDIATE SHIPMENT—FACTORY PRICE

No levers—no springs—no air pumps—drop the coin—**that's all**—the money makes its own signal.

Full line completely illustrated and priced in catalogue sent on request.

Buy Telephone Material from a Telephone House—Not from an "Electrical Department Store"

Rubber Covered Telephone Wire — New Prices

We carry an immense stock of the highest quality and most desirable assortment. Our prices are based on new copper costs and are most inviting.

Jumper, Distributing Rack, Pot Head, Interior Duplex, Triplex, Drop or Flameproof Duplex. All wires quoted lower than competitors offer.

SAMPLES AND PRICES ON REQUEST

Bois D'Arc Pins

Better than Oak, Locust, Birch or Maple

We have sold millions of these pins. Close grained, long lived.

Less than 2500, per 1000 .....$12.00
2500 to 10,000, " 11.50
10,000 to car.....Special Prices

Immediate Shipment,
Any Quantity From Stock

OUR BULLETINS TELL THE STORY—WRITE FOR THEM

Central Telephone & Electric Company

120 Liberty Street, New York City
237 Commerce St., Dallas, Texas

See our Exhibit at Electrical Show, Chicago, January, 1908

Makers of High-Grade Telephone Apparatus
Dealers in Telephone Supplies (Exclusively)
Main Office and Factory
2131-37 LUCAS AVE., ST. LOUIS, MO.

You know what you're buying when you buy space in TELEPHONY.

OKONITE TRADE MARK REG. U.S. PAT. OFFICE.

THE STANDARD FOR RUBBER INSULATION

OKONITE TRADE MARK REG. U.S. PAT. OFFICE.

1889
Paris Exposition
Medal

OKONITE
TRADE MARK
REG. U. S. PAT. OFFICE.

1893
World's Fair
Medal

OKONITE WIRES
MANSON TAPE
OKONITE TAPE
CANDEE WEATHER-PROOF WIRES

WILLARD L. CANDEE, H. DURANT CHEEVER, } Managers

GEO. T. MANSON, General Superintendent
W. H. HODGINS, Secretary

SOLE MANUFACTURERS

253 BROADWAY THE OKONITE CO., LTD. NEW YORK CITY

SERVICE MEASURED AIR AUTHORITIES

PAY-STATION SIGNALS
WHICH EVERY OPERATOR CAN UNDERSTAND

BAIRD "NUMERICAL" CODE—1 gong for 5 cents, 2 gongs for 10 cents, 5 gongs for 25 cents

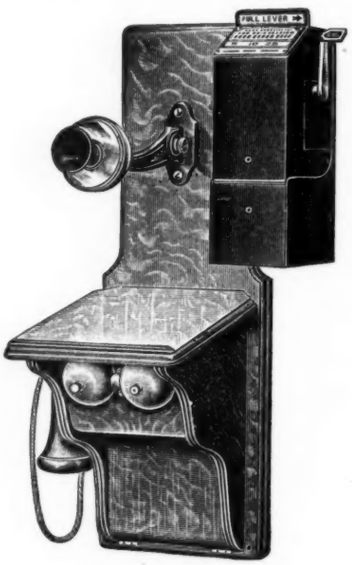
An expert operator will sometimes make mistakes on "Musical" tone signals; these mistakes generally mean loss to company.

The "Numerical" code can be learned by any operator in ten seconds.

It eliminates the necessity of distinguishing between different musical tones and thus prevents mistakes.

As coins are deposited blows are struck on a powerful cathedral gong according to denomination of coin.

ILLUSTRATED BULLETIN SHOWING ALL TYPES OF PAY-STATIONS SENT ON REQUEST



SPECIAL BAIRD FEATURES

UNBEATABLE SIGNALS
UNMISTAKABLE SIGNALS
SHEET STEEL CONSTRUCTION
SEPARATE CASH COMPARTMENT
COMBINATION LOCK
ONLY ONE COIN CAN BE DEPOSITED AT A TIME
COIN DEPOSITED IN WRONG SLOT RETURNED IMMEDIATELY

IF IT HAS A LEVER AND GIVES CLEAR AND LOUD SIGNALS IT'S A BAIRD

No. 63 Pay-Station Shown in Cut Can Be Mounted on Any Type of Phone

Baird Manufacturing Company
1503 Briar Place, Chicago.

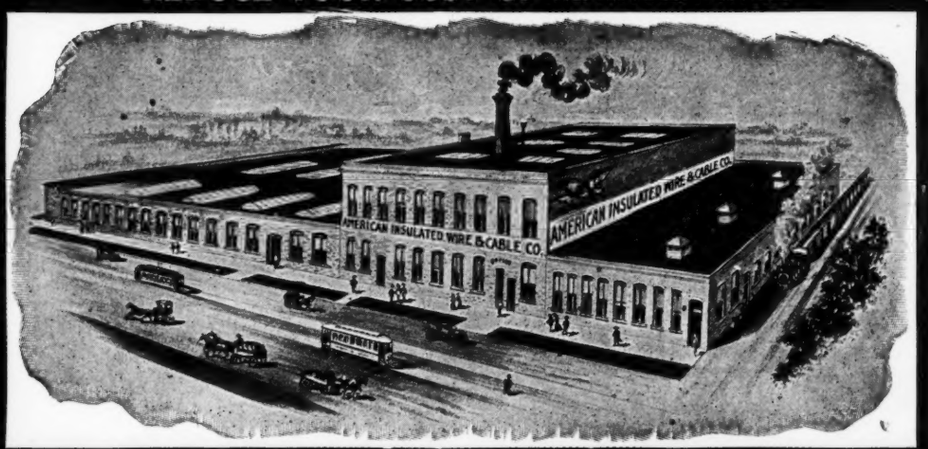
Genius is only another term for thoroughness.

IMPROVE YOUR TELEPHONE SERVICE

REDUCE YOUR COST OF MAINTENANCE

You will improve your Telephone Service by using the "American Brand" Weatherproof Wire, where you are now using inferior grades.

A.T. & T. Co 's Specifications.



You will reduce your cost of maintenance and please your subscribers by using the "American Brand" Weatherproof Wire.

A.T. & T. Co.'s specifications.

ESTABLISHED 1899

If your jobber can't furnish you the "American Brand" Weatherproof Wire, send your orders direct to us and we will ship same day order is received.

American Insulated Wire & Cable Company

21st, Sangamon and Morgan Sts., CHICAGO, ILL.

If you order **Roebling Double Galvanized Telephone Wire** you should receive it. If the *ROEBLING* seal is not on the bundle it is not *ROEBLING* wire. It may be galvanized market or fence wire, either of which is useful in its place, but the place is not in telephone service.

The *ROEBLING* seal means that the wire is DOUBLE GALVANIZED TELEPHONE WIRE, that it is uniformly drawn from high-grade material and galvanized by the *ROEBLING* process; a process which is distinctive, which is applied to *ROEBLING* wire alone, and which represents the best results of an experience of many years.

JOHN A. ROEBLING'S SONS COMPANY

MAIN OFFICE AND WORKS: TRENTON, NEW JERSEY

AGENCIES AND BRANCHES: NEW YORK CHICAGO CLEVELAND SAN FRANCISCO LOS ANGELES PORTLAND, ORE. ATLANTA SEATTLE

Advertise well, circularize well and you will do well.

NEW,
OR, REBUILT GOOD AS NEW!

"THE PREMIER SPECIAL"
(Compact Type)
GET OUR PRICES ON THIS TELEPHONE

WHICHEVER YOU PREFER,
We will Save You Money

For Latest List of
Bargains in Telephone Equipment

GET OUR NEW BULLETIN No. 7

We buy our apparatus very carefully and overhaul thoroughly that which has been used. Experts put it in the finest possible condition. Every piece is tested and found to be strictly O. K. before being shipped.

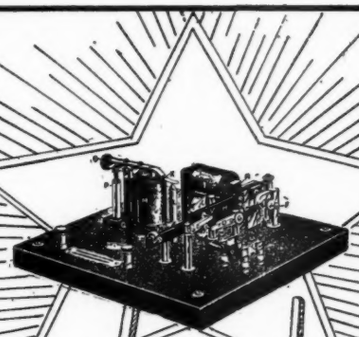
REMARKABLE OFFERINGS IN
Reconstructed Switchboards,
EQUAL TO NEW

All Standard Makes of Boards and Telephones. Write us your requirements and get our Quotations. We also handle all kinds of Telephone and Switchboard Parts. Try us on

Rubber Covered Wire, Cable Trolleys, Telephone Signs, Telephone Cords
and the
Celebrated PREMIER "BB" Cord

Premier Electric Co.
Van Buren and Clinton Streets, CHICAGO

THE WARNER POLE CHANGER STANDS HIGH



10TH YR. What's Your Guess?
9TH YR. 10500 sold
One Infringer stopped
8TH YR. 9000 in use. More Popular than ever.
7TH YR. 7500 in use. A Perfect Landslide.
6TH YR. 6000 in use. Everybody getting them.
5TH YR. 4700 in use. Take my Wife – Leave my "Warner."
4TH YR. 3200 in use "Tickled to death."
3RD YR. 1500 in use. customers still satisfied.
2ND YR. 750 in use. customers satisfied.
1ST YR. 250 sold sent on trial.

IF YOU HAVE A WARNER YOU KNOW YOU'RE RIGHT

AVOID IMITATIONS

WRITE FOR OUR CATALOGUE.

WARNER ELECTRIC CO.
Factories: {MUNCIE, IND., U.S.A. / WINDSOR, ONT., CANADA
General Offices: MUNCIE, IND., U.S.A.

For

Duplexers or Pole Changers Use the "Standard"

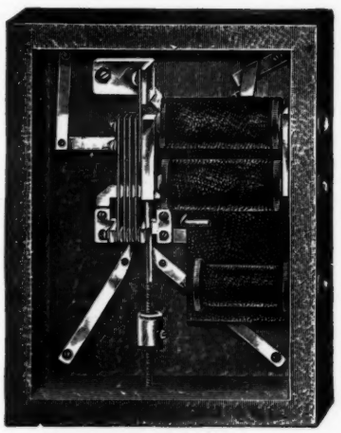
The Standard Pole Changer

Absolutely Guaranteed

Simple, efficient, economical. Only one battery of forty to fifty ordinary dry cells required. Works perfectly on all alternating and direct pulsating current ringing.

Sent on 30 days' trial.

Present price, only $15.00



"Standard" Pole Changer

The Standard Duplex Set

Another Money - Saver

By using this instrument, you can carry on two conversations over any single, metallic bridging line without either conversation interfering with theother. Let us explain it to you.

Sent on 30 days' trial.

Price complete, per set, $15

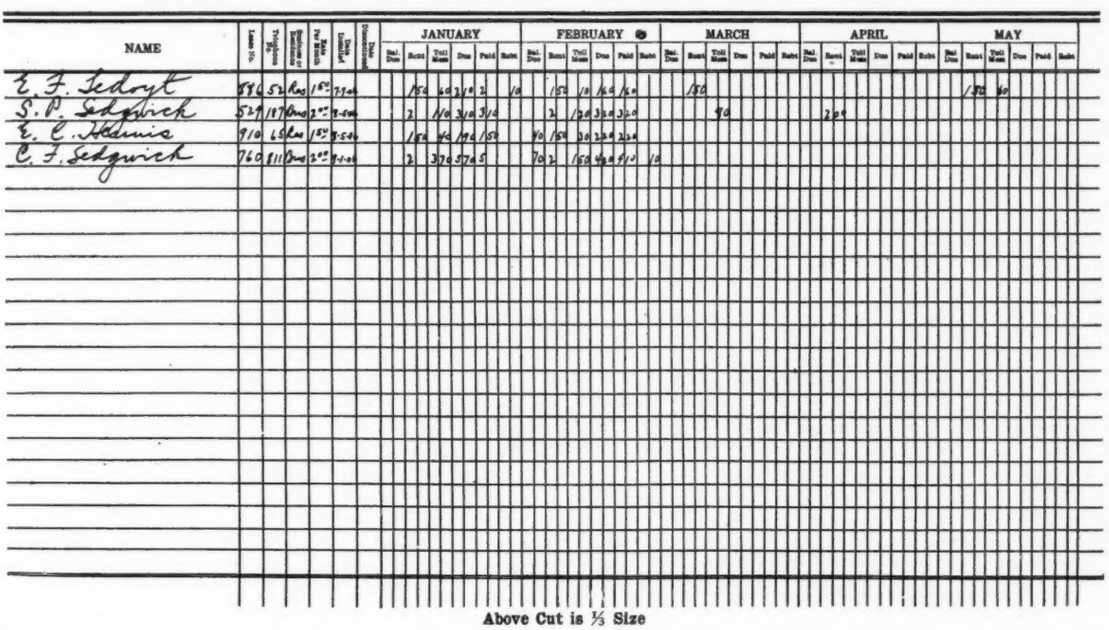
We guarantee both of above devices to be of the very highest standard. They have successfully withstood all tests of actual service and the keenest competition. The prices are attractive and the terms all that could be asked.

We want every telephone man to have full particulars

Have you our descriptive matter? If not, send us your address.

CURRENT ELECTRIC COMPANY, 52 State St., CHICAGO

TELEPHONE LEASE RECORD



Above Cut is ⅓ Size

THE most up-to-date lease record on the market. Well bound in cloth with leather corners and back. We have made a special study of your needs in this line and can meet your requirements. Sent prepaid to any address on receipt of price.

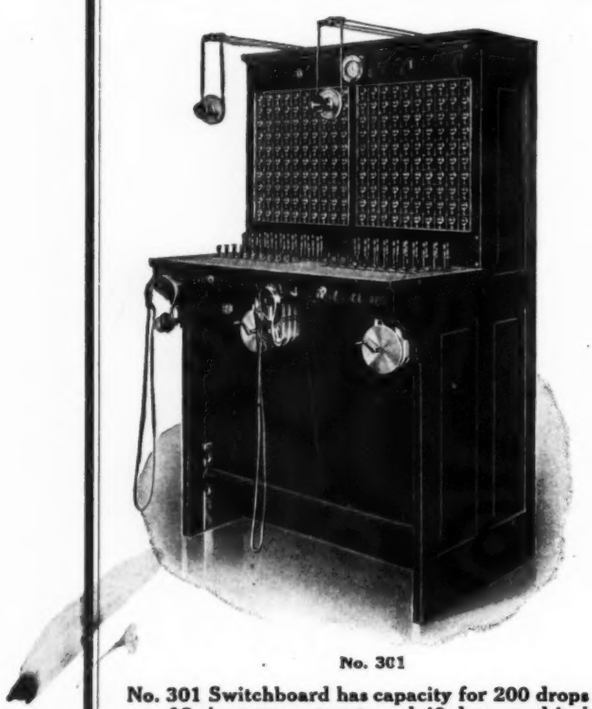
120-page book carrying 1,500 subscribers, $3.00 240-page book carrying 3,000 subscribers, $5.00

Send for Our Latest Catalog of Pole Changers, Ohmmeters and Duplexers.

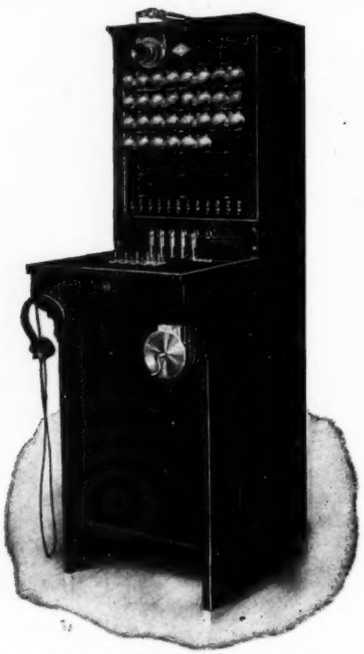
SANDWICH POLE CHANGER CO., 100 Eddy Street, SANDWICH, ILL.

Make no mistake in the medium you select. There's a difference.

SWITCHBOARDS



No. 301



No. 203

No. 205

No. 301 Switchboard has capacity for 200 drops and jacks. No. 203—Capacity for 100 drops and jacks or 24 ringer movements or 12 ringer movements and 40 drops and jacks. No. 205—Capacity 40 drops and jacks or 10 bridging ringer movements. The above illustrate 3 types of switchboards we manufacture. We have other types all illustrated in our No. 28 catalogue. All drops and jacks of unit type with removable coil feature. All of our four switchboards equipped with duplex wound clearing out drop. Condensers in cord circuit and other valuable and advantageous features not found in other makes. Complete specifications, prices and illustrated literature sent on request.

Showing coil being removed from front. No other part disturbed.

Showing coil removed. Instantly and easily done. Cannot be returned to place without making good permanent contact.

No. 9 Type of Drop and Jack.

Ask for Our No. 28 Catalogue

Swedish-American Telephone Co.,

1750-1770 East Ravenswood Park Avenue, CHICAGO, ILL.

Kansas City, Mo.

Sioux Falls, S. Dak.

IRONITE

Duplex Drop Wire

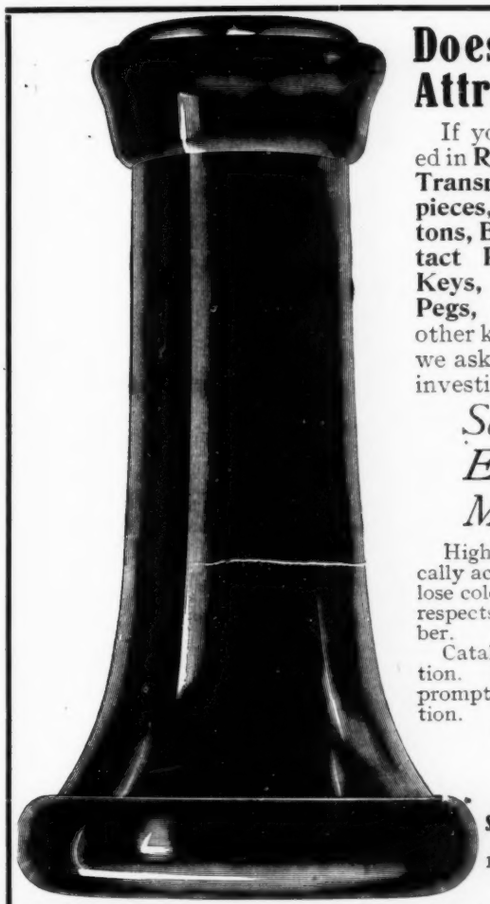
Never breaks inside the insulation. Every trouble man knows how hard it is to locate such a break and stop the trouble.

IRONITE will not sag or stretch. It is as flexible as hard drawn copper and will not break when twisted or "kinked."

The insulation of **IRONITE** is absolutely unequalled. **There is no satisfactory substitute,** and most important of all, **IRONITE costs 25% less than copper, even at the present low price of copper.**

Durant Electric Supplies Co.

58 Fifth Avenue, Chicago, Ill.



Does This Attract You?

If you are interested in **Receiver Shells, Transmitter Mouthpieces, Switch Buttons, Bushings, Contact Plugs, Knobs, Keys, Coil Heads, Pegs, Plugs,** or any other kindred articles, we ask you to kindly investigate

Scranton Electroid Material

High polish, mechanically accurate. Does not lose color and is in many respects superior to rubber.

Catalogue on application. Inquiries given prompt personal attention.

The Scranton Button Company
SCRANTON PA.

H. E. COBB,
1530 Monadnock Bldg.
Chicago, Western Representative.

Have You A Little IDEAL of Your Own?
WESTERN TELEPHONE MFG. CO., CHICAGO, ILL.
Est. 1893

Made in 3, 4, and 5 bar Sizes

Either Series or Bridging

"Ideal" Magneto Telephone

WIRE

WE MANUFACTURE
Weatherproof Copper Wire
Weatherproof Iron Wire
Galvanized Strand Wire
Office Wire and Annunciator Wire
CAN ALSO SUPPLY
All Makes of Bare Iron Wire
Compare our goods with others. Always glad to furnish samples and will guarantee our stock to be as good as samples

WE MAKE A SPECIALTY OF THE TELEPHONE TRADE

Years of experience in this particular industry enable us to fill every requirement satisfactorily. Send us your inquiries and orders.

Ask for list of jobbers who carry our wire in stock. You will be able to obtain prompt deliveries, either through them or from us direct.

Sterling Insulated Wire Co.

S. MANKOWITZ, Prop. Telephone Monroe 3236

MANUFACTURERS OF

Weatherproof Wires and Cables

240-244 West Lake Street, CHICAGO, ILL.

WE CARRY A COMPLETE LINE OF
High Grade Telephone Supplies
ALSO MANUFACTURE A BIG STOCK OF

Telephones and Appliances

Do you want to Save money and Please Your customers?

B-R TRADE MARK

Special Prices for Quantities.

Better get them

If you are looking for Up-to-date

APPARATUS AND SUPPLIES

ours will meet your requirements.

WE GUARANTEE: Lowest market prices, best grade materials, immediate shipments.

The B-R Electric & Telephone Mfg. Co.
KANSAS CITY, MO. and PORTLAND, ORE.

THE VOICE OF HIS CONSCIENCE.

A group of telephone men were telling telephone stories the other day, says an exchange.

"A couple of young lawyers were just shutting up shop to go home one evening not long ago," said one. "It was in a big building, and as it was about 9 o'clock, nearly all the windows were dark. One window across the alley, however, was light, and the curtain partly up, and just after they had turned off their own lights the two young fellows saw a man who was dictating in this room reach over and kiss the stenographer. They knew the man's name, that is, they knew the name lettered on his window; so they looked him up in the telephone book and one kept watch at the window, while the other rang him up.

"There were signs of perturbation in the room across the way when the bell rang. When he finally answered, the young fellow at the phone said: 'Stop kissing that girl.'

" 'Who—who are you?' came a quavering, stuttering voice over the 'phone.

" 'I am the voice of your conscience,' said the lawyer, and silently hung up the receiver.

TELEPHONES UNDER WATER.

Many of the vessels that ply the Great Lakes, says Inventive Age, are employing wireless submarine telephone service in order to obtain danger signals during storms. At all the rocks and shoals are located lightships or buoys with big bells, which are run during foggy and bad weather, but often these are not heard, and a vessel may easily be misled. With the submarine telephone equipment, these bells can be heard for a distance of two or three miles. A telephone receiver is placed in the ship's pilot house and transmitters are located in the lightships and buoys. Water is a better conductor of sound than air, and being below the surface, communication is not interrupted by wind, etc. The sound

RESULTS

During the past ninety days we have submitted over five-hundred "LONG DISTANCE" transmitters to as many of the representative exchanges in the country, with the request that they use the sample for thirty days and then return it to us at our expense if they were not so well pleased with them that they wished to keep and pay for the instrument.

We have received remittances from over 90% of all who have had the transmitter in service thirty days, and every mail brings us letters similar to this one—

Ozark, Ala., Nov. 12, 1907.

Gentlemen:

We are well pleased with the transmitter. The other operator wants one also, so we send you check to cover another transmitter like the one we have.

OZARK TELEPHONE CO.

May we send you one now on the same conditions?

Long Distance Telephone Mfg. Co.
Makers of "BETTER" Telephones
SOUTH BEND, - INDIANA

THIS TRADE MARK ON EVERY CHAIR

The McCloud
Adjustable Spring Back
Operator's Chair

Supports the back just where it needs it most while you are working. The back can be adjusted forward or backward to suit the operator.

The seat is 22 inches from the floor with a raise of 5 inches. All the chairs are equipped with the handwheel for raising or lowering the seat.

The foot-rest is just the right place to be a true rest. Everything considered this is the best operator's chair on the market.

No more back-aches. No more tired limbs. Operators will do better work if they use

The McCloud Chair

Write for catalog of the different styles.

The Davis Chair Co.
Dept. X
Marysville, Ohio, U. S. A.

is conveyed to the receiver on the vessel with great distinctness, and the service has so far worked with success.

CATCHING FISH BY TELEPHONE.

The principle of the telephone has been applied by a German inventor to the location of schools of fish by fishermen. A sensitive transmitter in a waterproof case is lowered in the water with a suitable connection on a fishing vessel or at some station. The passage of a shoal of fish causes a constant tapping on the case of the microphone, and in this manner the presence of the fish in the water is revealed to the fishermen at the station, and efforts are made at once to capture the school. The fishermen are in readiness, and they start at once, with the result that a great portion of the fish are captured. The device has been given a practical test, and it is said that it is possible to determine the character of the fish with more or less accuracy. Herring and such small fish passing in great numbers make a whistling noise, their numbers being largely indicated by the pitch of the sound, while codfish make a noise entirely different in character.

GERMAN-DANISH TELEPHONE CABLE.

A new submarine cable has recently been laid between the German island and Fehmern and Laaland, Denmark, representatives of both countries being on board the cable steamer during the work of laying. The object of the cable is to establish a direct line between Berlin, Lubeck and Copenhagen, which has been rendered necessary in consequence of the constantly increasing telephonic traffic between Germany and Denmark. It is stated that the new telephone cable has a total length of 19.3 nautical miles. The old cable now serves for telephony between Hamburg, Berlin and Copenhagen. The expenditure on the work has been borne equally by the two countries. The cable in-

THE VALUE OF TIME

Is never so apparent as in considering the difference in toll receipts when the messages are timed by the clock and pencil method and when the operator is equipped with

THE CALCULAGRAPH

By its use there is no opportunity for the operator to give the patron "the benefit of the doubt" or to display favoritism. The duration of each message must be and is accounted for, to the second. The CALCULAGRAPH mechanically computes elapsed time. Get our Booklets and prices.

CALCULAGRAPH COMPANY

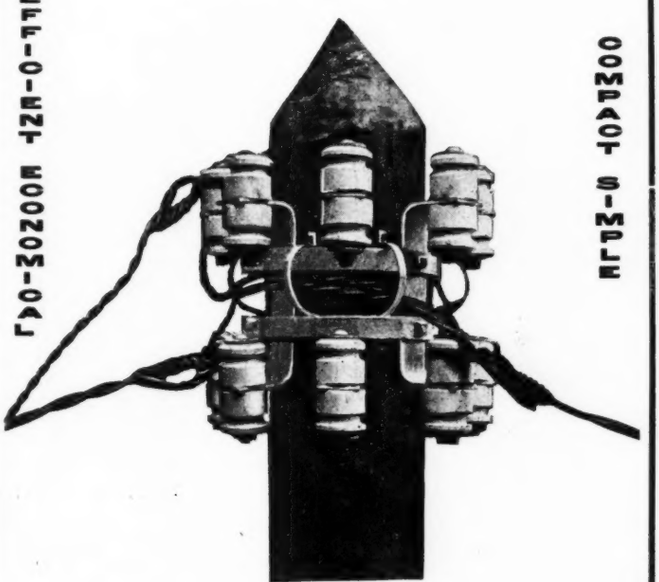
1416 Jewelers Building, NEW YORK CITY

Agents for Canada: Northern Electric and Manufacturing Co., Ltd. Montreal

Distributing Fixtures

(PATENTS PENDING)

EFFICIENT ECONOMICAL



COMPACT SIMPLE

MANUFACTURED BY

A. F. OLIVER MFG. CO.

No. 60 Cherry St., BUFFALO, N. Y.

VEEDER SWITCHBOARD COUNTERS

(STYLE 8)

Show rate of increase, so that exact calculations for the future may be made.

They likewise show how better to divide the work on the board among the operators.

Number of calls during each hour of the day can be shown. Interesting statistics are easily obtained by their use. Sockets fit in keyboard permanently. Counter can be inserted or removed at will.

Free Booklet describing 10 styles of Counters.

THE VEEDER MFG. CO.

No. 11 Sargeant St., HARTFORD, CONN.

Cyclometers, Odometers, Tachometers, Counters, and Fine Castings.

Half-hearted advertising never paid anyone.

Sound Proof Booths

Nothing Better Made

Send for Catalogue and Prices

We carry a complete stock and can usually ship the day order is received.

We also manufacture bank, office and store fixtures.

Fisher-Stevens Co., CHARLES CITY, — IOWA —

creases to five the number of German-Danish submarine cables for telegraphy and telephony, all of which have been laid in the past thirty years.

SALES CONDUCTED BY TELEPHONE.

A Milwaukee merchant, using space in a local daily paper, advertises:

"You can't buy any of these goods unless you telephone for them—that's the only way we are selling anything in this list."

Following is given a list of staple groceries including coffee, can goods, soap, etc., quoted at a reduced price for the day.

Assorted packages of staples are grouped also, and named, "Telephone Assortment No. 1, value 75c at 58c."

This firm assures prompt delivery from any one of their five stores in the city—all providing that the customer telephones the order.

This unique scheme is working out very successfully, both for the accommodation of the customer and the handling of an increase of sales without a great deal of floor space, and without much additional help.—Wisconsin Telephone News.

A TELEPHONE ROMANCE.

After a week's courtship, conducted mainly over the telephone, Jeanette Maddox, 18 years old, 472 Ninety-third street, a telephone operator in the South Chicago exchange, eloped with William Slagle of Buffington, Ind., and they were married Thursday in the Woodlawn Methodist Episcopal church. Mrs. Slagle is the daughter of William Maddox, a foreman for the Illinois Steel Company. Slagle called up a friend on the telephone and was attracted by the voice of the operator. He obtained an introduction, and because of the working hours of Miss Maddox did most of his court-

1 Gallon **Faultless** 1 Gallon

Insulating Compound

-"TRUE TO NAME"

For
Pot=Heads
Terminals
Telephone Cables
and
Cable Splicing

MANUFACTURED BY

CANDY & COMPANY

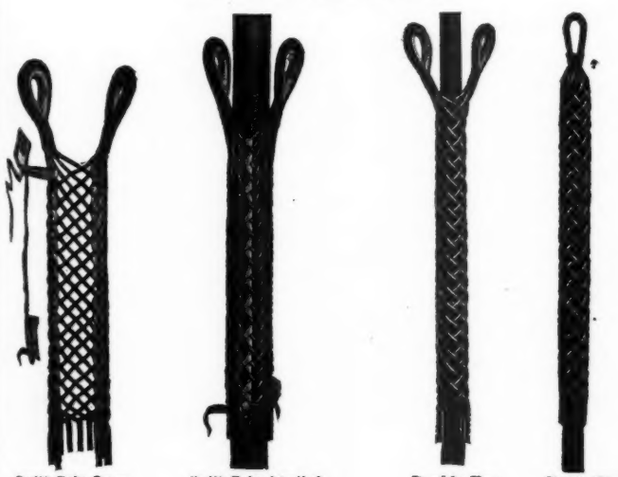
102-108 N. Lincoln Street

CHICAGO :: :: ILLINOIS

"GEM" CABLE GRIP

Never Slips. Time and Material Saved.

A Trial Will Prove.



Split Grip Open. Split Grip Applied. Double Eye. Single Eye.

Saves its cost in the first pull and guarantees a hold on the cable. Sales for the year 1906 exceeded that of previous year by thousands, which speaks volumes for its efficiency. Let's tell you more about the "GEM" and other goods.

Catalogue upon request.

COLMAN J. MULLIN

TELEPHONE SPECIALTIES

430 Kent Avenue **Brooklyn, N. Y.**

ing over the telephone. After the wedding Slagle and his wife returned to the home of her father, where they were received by the parents of the bride.

SHIPPING CABLE AS LIVE STOCK.

A young man employed as a construction superintendent by one of the telephone companies operating in the south, received as his first assignment, the job of restoring service in Mobile, in a certain section of the city where cable would be required even for temporary repairs. The company had none in stock and the railroad officials would not promise delivery from Chicago inside of three weeks. The young man, after some study, sent his order to Chicago and asked the salesman to go to the stock yards and purchase a calf. It was some time before the idea percolated through the cranium of the salesman, but when it did, he tumbled hard.

Three days late, a large reel of cable, with a calf tied to it, arrived at Mobile, addressed to the telephone company, bearing a large placard, "Livestock!—Please Rush!"

PERMANENT PLACES FOR TELEPHONES.

A Cleveland architect is designing a $40,000 apartment building for erection in Cleveland next spring, and the owner has instructed the architect to wire each suite in the building for a telephone. That will mean that those wanting telephones in their flats will have to locate them where the owner wants them. In apartment houses, as in dwellings, tenants' ideas as to where telephones shall be placed vary greatly, and every time the location of a telephone is changed it disfigures the wall. By providing for telephones when the building is being constructed that trouble is done away with and connections can also be made quicker than when all wires have to be strung afterward.

HELLO!

¶ Right in your telephone service is the place you will notice the great difference between the "1900" Dry Battery and others.

¶ Don't take our word for it—try them, they'll prove themselves.

The Nungesser Electric Battery Co.
CLEVELAND, OHIO
General Sales Office, 128 W. Jackson Blvd., CHICAGO, ILL.

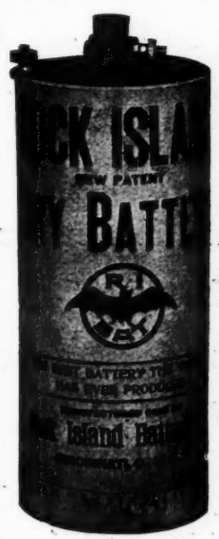
"The 'Chloride Accumulator' In Telephone Service"

¶ THIS NEW BULLETIN CONTAINING MANY PRACTICAL SUGGESTIONS ON THE CARE AND OPERATION OF TELEPHONE BATTERIES, WILL BE SENT UPON REQUEST

THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA
NEW YORK BOSTON CHICAGO ST. LOUIS CLEVELAND
ATLANTA SAN FRANCISCO TORONTO

TELEPHONE TALK and ROCK-ISLAND DRY CELLS

For the best results in Telephone Service the Batteries must be of good quality, and in competitive tests



Rock Island DRY CELLS

have proved BEST. Telephone Companies are large users of these new patent cells and they've indorsed them in largely increased orders.

Our Battery Booklet FREE.

No. 6 (2½x6 in.) and No. 8 (3½x8 in.) are our two Standard Cells.

See our exhibit at the Electrical Show, Chicago, January 13-25, 1908.

THE ROCK ISLAND BATTERY COMPANY,
903 Sycamore Street,
Cincinnati, Ohio.

R.I BPK

You know what you're buying when you buy space in TELEPHONY.

WE WANT NO CUSTOMERS

Who don't appreciate quality and workmanship. Our reputation was established on these points and we wish to maintain it. Don't ask for our samples and quotations unless you want first class goods.

Unexcelled in Mechanical Detail

Highest Grade Compound

SEAMLESS

SEAMLESS

Receiver Cases. Mouth Pieces.

Receiver Cases. Handles, Knobs, Etc.

Quality Unrivaled

Superior Finish

ALL KINDS OF ELECTRICAL INSULATIONS.

GENERAL INSULATE & MACHINE CO.

921 Chicago Stock Exchange Bldg., Tel. Main 3924 CHICAGO, ILL.

Main Office and Factory: 1008 to 1014 Atlantic Ave., BROOKLYN, NEW YORK

TOAST TO THE OPERATOR.

Here is a toast which was given by a Kansas City man, and which telephone operators will appreciate:

"Here's to the telephone girl. An employe who does the most work and suffers the most abuse for the money she receives. Who does the most favors that are unappreciated by those upon whom they are conferred. Who knows more about men than the sociologist does; more about women than the officer of the federation of clubs; more about the manner of children than the teacher does, and who can tell where every gentleman and lady lives. She is seen in all lands, and in all climes, and speaks all tongues, God bless her."

CENTRAL NEGLECTED HER.

"May I use your telephone?" a woman asked the cashier in a restaurant, says the Boston Herald. She wound the coil of the receiver around her finger and dangled the instrument. "What do you think of my hat?" she asked, wheeling herself around for inspection.

"It cost just—" And she whispered the price confidently. Then a long conversation followed. The telephone receiver dangled and bumped against the cigar case while its holder ran on about hats. After several minutes had elapsed the receiver was placed to her ear for the first time.

"Central," she scolded, "I have been trying to get No. exteen for ten minutes. You girls do not tend to business."

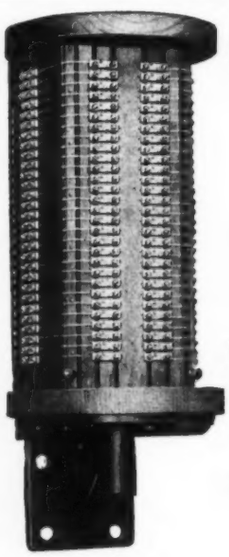
MICE!

The other day the Warner ringer at Wellington refused to work and an old hand generator was attached. On the first call that came in, the operator gave the crank a vigorous turn, which was followed by loud, squeaking sounds issuing from the generator. Again the crank was turned

Protect Your Cables

with the

Protective Can Top Cable Terminals



Patent Pending

Their Simplicity, Practicability, and Low Cost are worthy of your investigation.

Absolute Protection

No Pot Heads

Low Fuse Maintenance

No Wiped Joints

Compact and can be installed by anyone

Manufactured by

The Protective Electrical Supply Co.

Fort Wayne, Indiana

The "Poole"

C. E. Party Line

Lock-Out Makes—

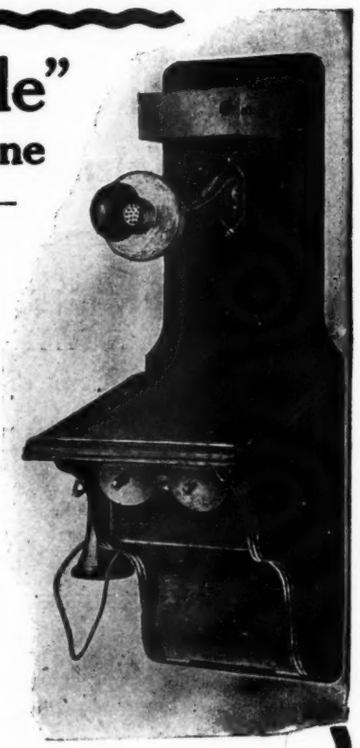
Pleased Subscribers

More Business

Reduced Maintenance

Increased Dividends

Fewer Troubles for the Manager



Write for **BOOKLET TL-2** and get our proposition for sample instruments.

Mountain State Electrical Co.

WHEELING, WEST VIRGINIA

Sole Manufacturers

Nothing is denied to well-directed advertising.

and louder came the squeaks. The operator thought it sounded like mice and demanded an immediate investigation. The case was opened up, and, sure enough, there was a mouse held prisoner inside the bars, and the squealing was evidently a strenuous protest against the tickling sensation which accompanied the turning on of the "juice."

CLEARED THE TROUBLE.

There is a troubleman at Loveland who doesn't let ordinary obstacles stand in the way of clearing a line. Recently trouble was reported on a line which runs through what was once a reservoir site, but is now a real reservoir. Arriving there he found that the water had been turned in, and the trouble was out toward the middle of the lake. Nothing daunted, the troubleman removed his clothes, swam out to the seat of trouble, and, treading water, cleared the line and swam back to shore. Luckily, the operator didn't ring out on the line just at that time, or he might have gone down to see what the little fishes were doing.

DISSATISFIED.

Because dissatisfied with the treatment accorded them by the Cumberland (Bell) Telephone and Telegraph Company, the business men of Pollock, Louisiana, have organized an Independent telephone company. Sufficient stock has been subscribed to insure the installation of a first-class system, and construction work is to be commenced at once.

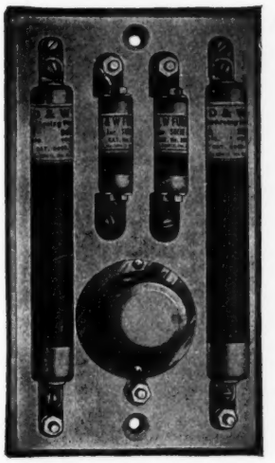
TELEPHONES AND THE POSTOFFICE.

Postmasters throughout the country have received notices from the postoffice department at Washington to the effect that postmasters and clerks are forbidden to answer telephone calls in regard to mail. The reason for the order is that it is not alawys possible to recognize the voice, so that

TELEPHONE PROTECTORS

—AFFORD CHEAPEST INSURANCE—

FIRE and Liability LOSSES Eliminated



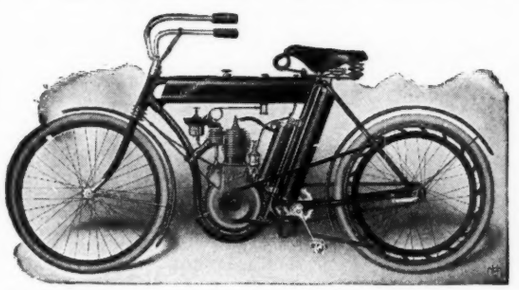
Approv'd by the National Board of FIRE Underwriters

"D&W" Fuses Protect

:: Send for Circular No. 102-T ::
Write for Prices on Quantity Orders

D & W FUSE CO.
PROVIDENCE, R. I.

ARMAC



ARMAC MOTOR CO., 472 Carroll Ave., Chicago, Ill.

Gentlemen: I am very pleased to be able to say that I have at last reached my destination after a trip of 1480 miles. After leaving Chicago, we went to Indianapolis, the machine behaved beautifully—the motor never missing a shot or never refusing to start or run fast or slow.

About hill climbing, well, I was pleasantly surprised as the machine climbed everything within the limits of reason without pedal assistance and that with a gear of 4-½ to 1.

Laurel Hill Mountain, just outside of Uniontown, Pa., was negotiated with only occasional assistance from the pedals and it is over three miles long, with a road surface resembling the dried-up bed of a mountain stream and full of sharp turns.

The Nigger, Big and Little Savage and some other big mountains were also passed and it is a wonder to me how the machine made them as the total weight of the rider and machine was 370 lbs. Then followed the National Pike to Cumberland, Md. After reaching the last named place we left the National Pike and went to Philadelphia, then to New York and on to Darien.

We encountered every kind of a road, some so bad that the farmers could not drive their teams over them while others allowed us to tear along at 45 miles per hour.

During the entire trip our actual running time was exactly ten days although fifteen days elapsed between the start and finish and out of all that time, only two days were without rain and five days it rained so hard that riding was an impossibility. If you could only see the roads and the hills that the ARMAC carried me over, you, too, would wonder that the motor could do the work. Why, on one hill we met a big touring car going up on low gear with the passengers walking. Of course, pedalling was necessary to help her a little but walking, never. When I get some pictures I'll mail you some.

Wishing you every success, I am Yours very truly,

NORMON C. TRUMPOUR, 5247 Calumet Ave., Chicago, Ill.

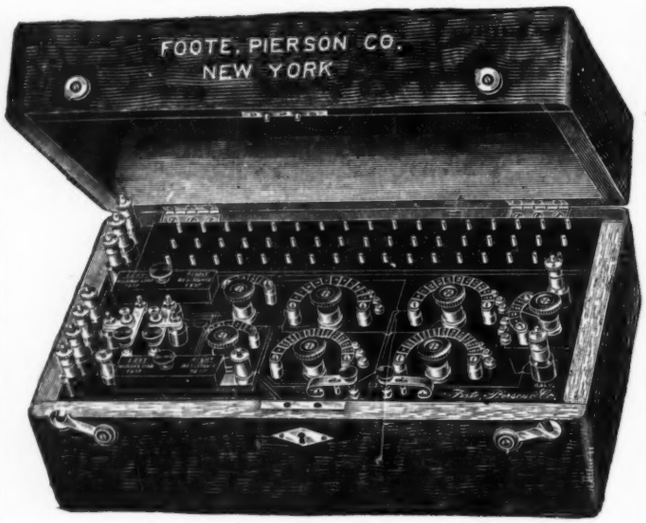
Cable Pole Seats
Cable Reel Jacks
Manhole Cable Hangers
Cable Winches
Pipe Bends
Pole Raising Wagons

Write for Descriptive Matter and Prices.

Anderson Forge & Machine Co. DETROIT, MICHIGAN

CABLE TEST SET

All Switches. Portable
No Plugs to Loose Simple, Accurate
Positive Contacts Handy, Quick



SPECIALLY ADAPTED FOR
TELEPHONE SERVICE

FOOTE, PIERSON & CO., 160-162 Duane Street NEW YORK

Telephone Engraving

is in a class by itself. Any artist can draw a picture or something NEARLY LIKE the real thing.

But it requires an artist with a TECHNICAL KNOWLEDGE of a TELEPHONE and its CONSTRUCTION to produce a proper illustration of it, or of telephone appliances.

In other words, he must be not only artist but MECHANIC.

We have made TELEPHONE ILLUSTRATING a study.

"WE'VE BEEN AT IT FOR YEARS."

"ASK McMEAL, HE KNOWS."

Write us in YOUR OWN TECHNICAL WAY.

WE'LL KNOW WHAT YOU ARE TALKING ABOUT.

ALL ENGRAVINGS IN THIS MAGAZINE WERE MADE BY

DEARBORN ENGRAVING CO.

ARTISTS, ENGRAVERS, PRINTERS

1322 Wabash Ave. CHICAGO, ILL.

the postmaster or clerk cannot at all times be certain as to the identity of the person at the other end who is making inquiry. The clerks cannot forward a letter, tell whether any mail has come for a certain person, give a change in address or in fact do any business over the telephone as that the rule forbids it.

REPAIRS UNDER DIFFICULTIES.

We know a troubleman who doesn't let ordinary obstacles stand in the way of clearing a line, says the Transmitter. Recently trouble was reported on a line which runs through what was once a reservoir site, but is now a real reservoir. Arriving there he found that the water had been turned in, and the trouble was out toward the middle of the lake. Nothing daunted, the troubleman removed his clothes, swam out to the seat of trouble, and, treading water, cleared the line and swam back to shore. Luckily, the operator didn't ring out on the line just at that time or he might have gone down to see what the little fishes were doing.

FOREST RESERVE TELEPHONES.

Extensive improvements are to be made in the Cascade reserve, Oregon, including the construction of many miles of telephone line and trails and houses for the rangers. Recently work began on a telephone line from Lowell, twenty miles east of Eugene, on the military wagon road and the present terminus of the Pacific company's line extending in that direction to connect with the Deschutes company's line at Odell, over the summit of the Cascades and 120 miles from Lowell. This will give direct communication from Eugene to Prineville, Shaniko and other eastern Oregon towns. Another line will be constructed from Eagle Point, Jackson county, to Crater lake, a distance of

HOW YOU HEAR
NOT
WHAT YOU HEAR
UNLESS
YOU HEAR HOW THE
OTHER MAN HEARS
WITH

THE EASOPHONE

¶ He tells you that his subscribers are pleased.
¶ They never report **"phone out of order."**
¶ They find the Easophone so **convenient, attractive** and efficient that the **wife** decides there must be one or two extensions on the first floor and also she **just cannot get along** without **one** or **two upstairs.**
¶ The exchange manager reads **the handwriting on the wall.**
¶ He sees that these enthusiastic subscribers are telling their friends about the **Easophone.**
¶ And **it becomes the Contract Agent.**
¶ Remember it is **How you hear.**

MAGNETO AND CENTRAL ENERGY

Write for our 30 day offer.

The Wire & Telephone Co. of America, Rome, N.Y.

MANUFACTURERS

Telephones, Telephone Supplies, Bare Copper, Annunciator and Rubber Covered Telephone Wire.

70 miles. This will be built in connection with a line projected by the Crater Lake Company.

INDEPENDENTS IN CINCINNATI.

The battle for an Independent telephone franchise in Cincinnati still continues. The Fitzsimmons Telephone Company Friday sent to City Clerk Henderson an ordinance calling for a twenty-five-year franchise. The ordinance will be presented to council at its meeting Monday afternoon. The proposed ordinance provides that the Fitzsimmons company shall have a complete Independent service in operation within two years from the passage of the ordinance. Accompanying the ordinance is a letter, signed by H. Burckhardt, president of the Fitzsimmons company, asking the council for a hearing of the ordinance.

FORT WORTH WANTS LOWER RATES.

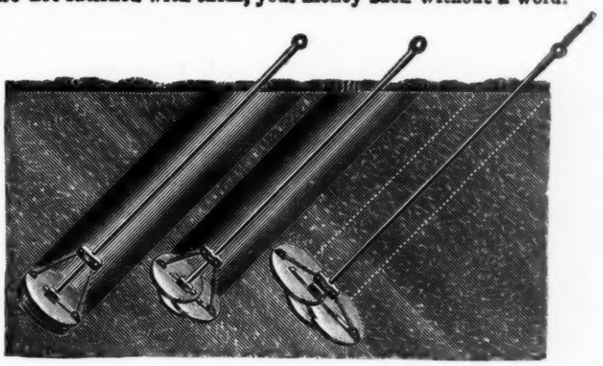
The city commissioners of Fort Worth, Texas, appointed to ascertain why the Southwestern (Bell) Telephone Company does not furnish satisfactory service will, in all probability, also advocate the adoption of an ordinance to regulate telephone rates. Such power is given the commission under the new charter. The mayor is in favor of municipal regulation of the Bell rates, which are said to be greatly in excess of those charged by Independent companies in cities of the same size.

TRAVELING TELEPHONES.

The Civil and Military Gazette of London reports that Lord Kitchener has accepted for use in India a form of movable telephone, which can be employed with great facility in the field. The cable weighs only seven pounds per mile, but is so well insulated that it can be stretched across a stream of water without loss of current. It withstands a strain of 120 pounds. An apparatus for placing and re-

THE EVERSTICK ANCHOR
THE ANCHOR OF MERIT

Everstick Anchors are sold under the money back plan. If you are not satisfied with them, your money back without a word.



1 2 3

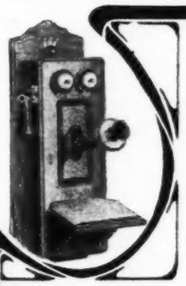
Fig. 1—Represents Anchor placed at bottom of hole.
Fig. 2—Partially expanded.
Fig. 3—Fully Expanded.

Everstick Anchors are made in four sizes:

No. 5— 5-inch diameter expands to 9 inches.
No. 6— 6-inch diameter expands to 11 inches.
No. 8— 8-inch diameter expands to 15 inches.
No. 10—10-inch diameter expands to 19 inches.

The Everstick is the best Guy Anchor on earth, in the earth or any place else. Made of malleable iron and cheap. Write for prices.

THE EVERSTICK ANCHOR CO.
17 SO. MAIN STREET. ST. LOUIS



WHERE DO YOU GET YOUR
TELEPHONE SUPPLIES

We have made a special study of the telephone trade and whatever may be your needs a word to us will bring full information as to goods and prices.

Prompt Shipment of Orders.

DOUBLEDAY-HILL ELECTRIC CO. D-H E C ELECTRICAL SUPPLIES PITTSBURG ALL MATERIAL GUARANTEED TRADE MARK

Let us quote you prices.

DOUBLEDAY-HILL ELECTRIC COMPANY
919 LIBERTY STREET, PITTSBURGH, PA. CHARLOTTE, N.C. SOUTHERN WAREHOUSE

GENERAL ELECTRIC COMPANY

Edison Telephone Lamps

Thorough uniformity of all lamps, insuring certainty of contacts and no misfits.

Cut shows regular 24-volt tipped lamp, base 54 G. 885

Main Lamp Sales Office, HARRISON, NEW JERSEY

TELEPHONY has led all of the successful telephone fights.

The Largest Manufacturers of Glazed Earthenware in the World

Factories in Five States

American Sewer Pipe Company

CONDUITS

GENERAL OFFICES: **PITTSBURGH, PA.**

moving the cable, working automatically, and capable of being attached to a saddle, is employed. Recently in the Punjab a horseman, proceeding at a gallop, placed the cable over a distance of two miles in seven minutes. To remove it eighteen minutes were required.

ONE WAY TO GET "GROUND."

When an installer puts in a new telephone it is necessary for him to "ground" it, that is run a wire to the ground either to make a circuit or to insure protection against lightning, says the Michigan State Gazette.

But one installer had a case in which he could find no place to ground the instrument. As the next best thing he ran the ground wire to the brick wall just outside the window, drove a nail into the wall and attached his ground wire to it.

"If your telephone doesn't work well," he explained to the subscriber, "just pour a bucket of water against the wall."

MARRIED.

William Roy Adams, sales manager for the American Sewer Pipe Company, of Pittsburg, Pennsylvania, has many warm friends and acquaintances in the telephone field who will be pleased to learn of his marriage on November 27 to Miss Ethel Gertrude Eckert, of Allegheny, Pennsylvania.

HOME FOR TELEPHONE OPERATORS.

Miss Chloe Mattison, secretary of the Wyandotte Chautauqua Association, is working on a proposition to build a cottage for the "hello" girls of the two Kansas Citys—Kansas and Missouri. It will be located near the city park, Kansas City, Kansas, on the Grandview car line and furnished with every convenience of a home. Books, settees,

The

H. B. Camp Co.

Manufacturers of

"Camp" Standard Vitrified Clay Conduits

SALES OFFICES:

Fulton Building, - - PITTSBURGH
Flatiron Building, - - - NEW YORK
Hartford Building, - - - - CHICAGO

VITRIFIED

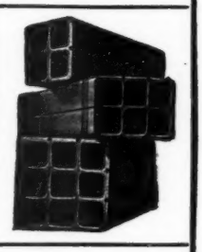
Clay Conduit

—FOR—

Underground Installation

FACTORIES:

New Jersey
Pennsylvania
Ohio



ALL STANDARD SIZES IN SINGLE AND MULTIPLE DUCT

SPECIAL WORK TO ORDER

EXCELLENT SHIPPING FACILITIES

See our exhibit at the Electrical Show, Chicago, January 13-25, 1908.

B. S. Barnard & Co.

39-41 Cortlandt St., :: New York City

"Supplies Wanted" published free in TELEPHONY'S Daily Report.

easy chairs and hammocks are to be among the furnishings. There will be accommodations for beds and a kitchen. Miss Mattison claims she has now the active indorsement of both telephone companies in the city in her plans. It is her idea to raise the funds for the construction of the cottage and its maintenance by giving two big minstrel shows, one in each Kansas City.

NEW KIND OF TROUBLE.

A farmer living near Carthage, New York, has brought a novel complaint against the telephone company operating in that territory. He demanded that the telephone lines strung near his house be removed forthwith. When pressed for a reason, he stated that his greatest source of income was from the sale of honey gathered by his bees. He said they were accustomed to fly across the telephone company's right-of-way to a buckwheat field, and that thousands of them were killed by striking the telephone wires.

"GASS" LIGHT IN THE HOUSE.

A clever Muncie judge
Has hit upon a plan
That's sure to bring to him
Loud praise from every man.

He couldn't go to lodge
And leave his court alone,
So the latter came to him
By long distance telephone.

Now thanks to his success,
Lodge meetings may be held
By the absent treatment method,
And domestic clouds dispelled;

For husbands never more
Will wifely doubts inspire
If they stay at home each evening,
And go to lodge by wire.
—N. Parker Jones, in Lafayette (Ind.) Journal.

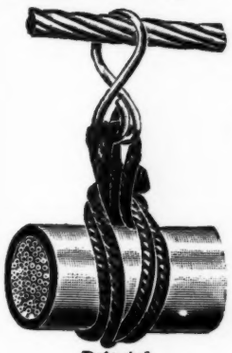
LONG SAUT **Combination Cable Clamp**

FOR INTERIOR BLOCK DISTRIBUTION

Does Away With Pole Lines, Simplifies Construction and Reduces Cost of Maintenance.

Can be furnished with or without bridle ring.

Patented



Patented

Simp-Lock Aerial Cable Hanger

Cannot Jump the Messenger Wire, Hook Cannot Open.

Diamond Expansion Bolt Co.

9 Murray Street **New York, N. Y.**

The Flexiphone

Sent on 10 days' trial. Write for special offer.

¶ **SAY! MR. EXCHANGE MANAGER,** we can save you money. You remember the desk sets down in the **Railroad Offices** and also those over in **Hurry Up & Co.'s** main office—busy places these. Well your repair men were over there twice last week and three times the week before. ¶ Cord was broken and receiver smashed once, hook bent and transmitter out of service another time. Your repair men say those desk sets are always being knocked on the floor. ¶ **The FLEXIPHONE stops all that trouble.** Do you know that time is money, that it is costing you many times the price of a Flexiphone to keep those desk sets in commission. ¶ Better send for some sample **Flexiphones,** and besides these railroad people will find the Flexiphone very convenient.

The Holtzer-Cabot Electric Co. Chicago, Ill. Handles the Middle West.

Oliver Mfg. Co. Philadelphia, Pa. Handle Atlantic, Gulf and Pacifc States.

The Holtzer-Cabot Electric Co. Brookline, Mass. Handles New York and New England States.

C. P. C. Fire-Clay Conduits Are Best Quality

ORDER NOW FOR NEXT YEAR'S WORK

Take Advantage of Present Low Prices and Winter Manufacture

WE WILL STORE THE WARE FOR YOU

P C C

THE CLAY PRODUCT COMPANY

Sales Dept., 508 Isabella Building, CHICAGO - - **Factory and Mines, BRAZIL, IND.**

TELEPHONY is the only telephone medium swearing to its circulation.

"INSIDE IN" OR "OUTSIDE OUT."

A trouble man connected with the Detroit exchange was sent to clear a case of trouble in the Grand district, according to the Michigan State Gazette. He found his trouble in the outside wiring, for which purpose ordinary simplex wire had been used instead of regular drop wire. He made his repairs and reported as follows: "Inside wire is outside. Put outside wire on the outside from top of building to the basement. I run in outside wire outside instead of inside wire outside."

READ YOUR TRADE PAPER.

Trade journalism has developed so rapidly that to-day there is scarcely any line of business that does not have one or more journals devoted exclusively to its interests. These journals wield a strong influence in their respective fields—in many lines they are considered the final authority. Every copy of a good trade journal hits the mark. It is bought because it means dollars and cents to the buyer; its contents refer directly to his work; it is not read for pastime or amusement, but because the information it contains is of practical, every-day use.—Produce News.

ODD CAUSE OF "TROUBLE."

Peculiar circumstances are often responsible for suspension of telephone service. At Watertown, S. D., recently a spoonbill duck was the cause of the suspension of the long distance telephone service east of that city for several hours. All tests known to the management were applied, but failed to locate the seat of trouble. A lineman was dispatched by team to ascertain the cause. He found that just east of Altamont, the third station from that city, on the Northwestern railroad, a spoonbill duck, in its flight from one lake to another, had evidently started to quack either a

T. M. PARTRIDGE LUMBER CO.

Producers

WHITE CEDAR POLES

Send us your inquiries and orders AND SAVE JOBBERS' PROFITS

¶ Have Yards in Minnesota, Wisconsin, Ontario and Manitoba and can ship quick to any part of the United States or Canada.

GENERAL OFFICES:

Lumber Exchange **Minneapolis, Minn., U. S. A.**

PENDLETON & GILKEY

MINNEAPOLIS, MINN.

PRODUCERS OF EVERYTHING IN CEDAR

CEDAR POLES

All Sizes Large Stock

Low Prices Prompt Shipments

YARDS:

MOUNTAIN, WIS. **OCONTO, WIS.**

MICHIGAN WHITE CEDAR

POLES

WILL OUTLAST ALL OTHER KINDS

We can fill orders for all lengths and sizes, from our own stock.

We had over 175,000 Poles in Stock, May 15th, 1907 Put your orders in early.

PROMPT SHIPMENTS

(For 27 years we have been producers)

W. C. STERLING & SON CO.

Principal Office: Monroe, Mich.

Yards: Bay City, Omer, Boyne Falls

greeting or a warning to its mate and had caught the wire full in the mouth. The momentum had carried it against a second wire, the two forming a vicelike grip upon the birds' neck, the body making several revolutions around the wires and twisting them into a cable, thus short circuiting the system. The duck, with a broken neck, was still suspended from the wires when the lineman reached the scene.

THE TELEPHONE NEXT DOOR.

Some contributor to the Detroit Free Press apparently has a telephone and several neighbors who have none but who are addicted to the habit of using the "telephone next door." At least the following verses would indicate as much:

Oh, a wonderful thing is a 'phone in the house,
That is hung in the wide dining hall;
It keeps you in touch with your neighbors, you know,
For they drop in to pay you a call.
At 6 in the morning you're roused from your sleep
In response to the door bell's harsh tone;
You shiver and freeze in your nightie, the while
A neighbor makes use of your 'phone.

You sit down to breakfast and start in to eat,
When a neighbor comes in with a smile,
"Don't mind me, I just want to 'phone," she declares,
I'll be through in a very short while."
At dinner and supper, between meals as well,
It's seldom you're left all alone;
For there's always a friend dropping in for a chat—
With someone else over your 'phone.

At night when you've settled at ease with a book,
And in slippers are resting your feet,
Comes a ring at the 'phone, and a sweet voice requests
You to call someone over the street.
Though the night may be stormy and chilling and bleak—
Very frequently such nights are known—
In your slippers you hurry to summon a friend
To come and make use of your 'phone.

Oh, a wonderful thing is a 'phone in your house,
Night and day you're in touch with your friends;
And you'd not be without, for on it you find
The comfort of living depends.
For the people who never before came to call,
A most friendly spirit have shown,
And they actually smile when they come to your house
To ask for the use of your 'phone.

Particular Buyers

It is the discriminating purchasers of Cedar Poles that we like to do business with — they appreciate Quality and Good Service. This we offer you.

Page & Hill Co.

White and Idaho Red Cedar Poles

Lumber Exchange Minneapolis, Minn.

CEDAR POLES

Large Stock; Best Quality; Prices Right
Write us before purchasing elsewhere

WITTENBERG CEDAR CO.

WITTENBERG, WISCONSIN

White Cedar Poles

14 to 65 Feet Long.

Francis Beidler & Co.

Prompt Shipment Chicago, Ill.

Pole Yards:

MENOMINEE, MICH.
ESCANABA, MICH.
SUPERIOR, WIS.
DEER RIVER, MINN.

Located on Nine Railroads.

Platinum Plate on Sheet Copper Brass or German Silver

Plated on One Side, or on Both Sides, any Thickness, of Pure Platinum Plating, on Base Metal.

Copper or German Silver Rivets, Platinum only on their Heads—Platinum Plated Wire.

Though our Product is, as everybody knows, the making of Seamless Steel and Seamless Brass Tubing, we discovered a method of Plating with Pure Platinum on Base metals, such as Brass, Copper, German Silver, Iron, Steel, etc. Sent samples to a few telephone manufacturers, and the results were surprising.

Those who were told about it ordered and have been sending in their orders for a year or more—we have decided to add it as a sort of ally to our business, and this advertisement is the first real public hint we have given of it.

We don't like to use adjectives—rather hear you use them after you see the samples—or try it. You know, and always have known what a platinum disc means to a telephone transmitter. The cost alone made it prohibitory. Its now reachable, its price is only a fraction of what it was.

We will be glad to send samples, answer questions, or both.

ELLWOOD-IVINS TUBE WORKS
Mills, Oaklane Station, Philadelphia, Pa.

G. T. WESCOTT, 315 Chamber of Commerce, Chicago.
Representative for West.

WHAT NEXT.

A telephone company in Indiana recently received a request to furnish and set a telephone at the head of a grave in one of the local cemeteries. The woman who wanted the instrument installed is a strong believer in spiritualism and holds frequent conversations with the departed relative. As she cannot talk with the dead unless she is at the grave, she conceived the plan which would relieve her of the necessity of making trips to the cemetery.

TELEPHONES IN SPAIN.

Consul General B. H. Ridgely reports from Barcelona that there are only three telephone companies of any importance in Spain. The apparatus mostly used comes from Paris and Stockholm, and is of the magneto type. The Barcelona company has in use 3,053 telephones, at an average rent of $55 each per annum. They also operate a subsidiary company, reaching to other cities, while a third company, a branch of the Barcelona company, operates 2,440 telephones, with Madrid for a center. All told, these associated companies purchase about 525 telephones a year. They are energetic and growing, and will probably in the near future take active steps to develop the long-distance system, which up to date has been very little developed.

SPOKE DUTCH.

An independent telephone company lineman vouches for this story, as he put in the telephone himself at the home of a prosperous farmer in Pennsylvania: "When it was ready for service, the farmer asked whether it would talk Dutch or English, and when told that the instrument was equally effective in both tongues, he tried it, calling up his daughter's residence. He was much pleased, and paid his rental cheerfully."

Chestnut Poles

Try spending two cents
getting our prices before placing your orders

All Lengths **Can ship to-day**

PADUCAH POLE & TIMBER CO.
PADUCAH, KY.

CHESTNUT POLES
FOR QUICK SHIPMENT

500—6" tops 25' long
500—7" " 25' "
1500—7" " 30' "
1000—7" " 35' "

With a fair stock of longer poles. Can also furnish 8" tops when required.

NASHVILLE TIE & CEDAR CO.
NASHVILLE, TENN,

CHESTNUT POLES

ALL LENGTHS
20 YARDS

DAVISON & McBRYDE
NASHVILLE, TENN.

WE HAVE THE FOLLOWING

JUNIPER POLES

IN STOCK:

100—40 Feet Long, 7-inch Tops	30—50 Feet Long, 8-inch Tops
50—40 Feet Long, 8-inch Tops	10—55 Feet Long, 7-inch Tops
50—45 Feet Long, 7-inch Tops	10—55 Feet Long, 8-inch Tops
50—45 Feet Long, 8-inch Tops	20—60 Feet Long, 7-inch Tops
30—50 Feet Long, 7-inch Tops	5—65 Feet Long, 7-inch Tops

These Are THE BEST POLES on the Market

We would be pleased to have inquiries for Delivered Prices on same.

HOUSTON & LIGGETT, Lewisburg, Tennessee

There is nothing stronger than the simple truth.

CAN'T MARRY WITHOUT PERMISSION.

There is a storm in the telephone teacup in Paris owing to the circular which has been sent out to the young women operators.

The circular states that telephone employes in future will have to get the permission of the postmaster-general before they can marry. Until this permission is granted, no date for the ceremony may be fixed.

Such employes are not allowed to marry foreigners, members of the police force, detectives, mayors, mayor's clerks or cashiers. The reason given for this peculiar rule is "the safeguarding of the secrets of the public."

TELEPHONE MARKET IN CHINA.

F. D. Cloud, of the United States consulate at Shanghai, writes as follows of the telephone in China: "The telephone also, while still in an undeveloped state, is destined to play an important part in the development of the new China. Wherever the telephone has been used by the Chinese it has made a lasting place for itself, and at the present writing there are many systems in various parts of the empire being talked of and organized, many of which are certain to be installed, and since the Chinese do not manufacture telephonic or telegraphic supplies, there should, in the near future, be an extensive market in China for this iine of goods."

BELL INCREASES RATES AT PITTSBURG.

The Central District and Printing Telegraph Company (Bell), has raised party line rates at Pittsburg from $42 to $44 and announced that four-party lines will be abolished altogether. In their place will be substituted two-party lines. The order has aroused the ire of many subscribers and there is talk among a large number of dropping the use of the Bell telephone altogether.

Rubber Covered Wires and Cables

For all Classes of High-Grade Electrical Service.

National India Rubber Co.

BRISTOL, R. I.

New York Office, 42 Broadway

Monnot Copper-Clad Wire

Costs less and is superior to Pure Copper Wire, as it affords the non-oxidizable, acid-proof qualities of copper — combined with the tensile strength and high elastic limit of steel. This is

Monnot Copper - Clad Wire

(A steel wire with non-porous, welded copper coat)

Let us send you our booklet It tells the story

DUPLEX METALS COMPANY NEW YORK MONNOT METALS TRADE MARK.

Duplex Metals Company, 208 Fifth Avenue, NEW YORK CITY

WORKS AT CHESTER, PA.

IDAHO Red Cedar Poles

We also handle

Michigan White Cedar Poles

8 Yards in Idaho—2 in Michigan

WE MAKE LOW PRICES

Address:

Western Lumber & Pole Co.

Main Office, Suite 415 Charles Bldg. DENVER, COLO.

Maine Black Birch Pins and Brackets

Are being imitated. Black Birch from Maine is the best by test. Accept no substitute. Ask us about our latest proposition whereby carloads can be carried in stock without much expense.

CORRESPONDENCE INVITED. SPECIAL WORK PROMPTLY.

MAINE HUB AND MANUFACTURING COMPANY : : : West Seboois, Maine

Western Sales Agents, The W. R. GARTON COMPANY, 118-132 W. Jackson Blvd., Chicago, Ill.

Idaho Cedar Poles

PACIFIC COAST POLE COMPANY

Spokane, Wash.

The Lindsley Brothers Co.

Producers and Shippers of

Western Cedar Poles

and Manufacturers of

RED FIR CROSS ARMS

SPOKANE, WASHINGTON

EASTERN SALES OFFICE

835 Monadnock Bldg., Chicago

Don't you need a good list to circularize from? TELEPHONY'S is best.

Red Cedar Telephone Poles

Genuine Tennessee Stock

Prompt Shipment and First-Class Material
Write us for Prices

Nebraska Bridge Supply & Lumber Co., Omaha, Neb.

Yards at Nashville, Edgefield and Greenback, Tenn.

PEIRCE KNOB RACKS

for twisted pair distribution afford plenty of space for the lineman's work. Cheaper than other styles with twice the efficiency. Can be used in pairs. All jobbers or direct from

PEIRCE SPECIALTY COMPANY
Chicago, Ill. and Elkhart, Ind.

Yellow Pine Cross Arms

From Alabama Yellow Pine Virgin Timber

We own both timber and mills.

Our Inducements to you are

GOOD MATERIAL QUICK SHIPMENTS

In the market or going to be?

Write us to-day for prices.

Southern Pine Mfg. Co., PADUCAH, KY.

Buy direct of the Manufacturer and save from

25% to 50%

Write us at once for prices on Rock Elm and Oak Telephone Insulator Pins.

BADGER PIN CO.

Wonewoc, Juneau Co. Wisconsin

FORT WAYNE HOME PAYS DIVIDEND.

The Home Telephone Company, of Fort Wayne, Ind., has distributed the checks for the semi-annual three per cent dividend on the common stock. A block of twenty shares of preferred changed hands recently at par and accumulated dividend. The company has given an order for 25,000 feet of cable to make numerous extensions on its lines in Fort Wayne and suburbs.

The telegraph strike has served to emphasize the importance of the telephone, which is coming more and more into use, says the Raleigh (N. C.) News-Observer. It is but yet in its infancy, but the day will come when the telephone will largely put the telegraph out of business. Anybody can telephone and anybody can talk over the telephone, and experience shows that there are about as many mistakes by wire as by telephone. The inventors are every year perfecting the telephone and before many years you will be able to talk without straining over the telephone from Raleigh to Chicago any time.

Something of a stir has been created in Richmond, Virginia, by the announcement that Alderman Bennett would offer a resolution providing for the appointment of a special committee to investigate the advisability of revoking the charter of the Southern Bell Telephone Company in Richmond on account of alleged insufficient service.

A telephone operator in a Massachusetts town courted a telephone operator in Schenectady over the wire, and now they are married. This should be a great relief to those telephone patrons of the two towns who have so often found the line busy.—Cleveland Plain Dealer.

We Think that Twisted

Telephone Pair

Is good enough business for a SPECIALTY.

May the goods have an opportunity to speak for themselves? They are

UNPREJUDICED AND HONEST

DETROIT INSULATED WIRE CO.
DETROIT, MICHIGAN

The Independent Manufacturer of Electrical Instruments and Appliances Needs

Silk Covered Magnet Wire

Made by an Independent Manufacturer.
That's What You Get When You Buy

GRIFFIN MAGNET WIRE

The quality is right; so are the prices. A sample order on approval will convince you. Sizes 20 to 40 inclusive.

FRANK B. GRIFFIN, Oshkosh, Wisconsin

MANUFACTURER OF INSULATED WIRE

(NOT CONTROLLED BY ANY TRUST OR COMBINATION)

Make no mistake in the medium you select. There's a difference.

To Telephony's Advertisers

"CONFIDENCE"—a brief business essay.

"CONFIDENCE" is a word in everybody's mouth these days. Confidence is a wonderful item in the business world. Confidence makes fortunes, and the loss of confidence destroys them. Want of confidence has ruined men and moneyed institutions of the highest rank, while confidence in a man and a given proposition will enable them to win where others fail.

TELEPHONY enjoys the confidence of the telephone world, and is prouder of that distinction than of any of its other more material assets. Confidence in this publication is not an impulse or a passing fancy, but a deep-rooted loyal sentiment, begotten of years of clean, faithful and energetic service in behalf of the best interests of the telephone field. Every telephone man knows TELEPHONY and its record.

It has a plain outspoken policy and adheres to it rigidly.

It tells the truth about its circulation—and swears to it.

It publishes its rates broadcast.

They are fair to all alike.

It refuses to publish reading matter or advertising inconsistent with its principles or injurious to the interests of its readers and supporters.

This, in brief, is what gives TELEPHONY its exceptional strength—"Confidence."

Put a pin there—most of you appreciate what confidence means these times.

"ECONOMY"—same being Chapter II.

Also, Mr. Advertiser, it is in times like these that you are bound to appreciate most the value of economy.

It is now, more than ever before, that you want to know just what you are buying when you purchase advertising—, and that is where TELEPHONY shines.

TELEPHONY gives you sworn statements of its circulation—over 10,000 each and every issue.

TELEPHONY covers every organized telephone company and buyers of importance throughout the telephone field. When desirous of avoiding duplication or unnecessary expense telephone advertisers can restrict their appropriation to TELEPHONY alone and feel sure that they are covering the trade.

TELEPHONY issuing but once a month, is also inexpensive as an advertising medium, while its age, contents and standing in the field insure its being carefully read by practically all of its over ten thousand recipients.

TELEPHONY provides its advertisers with the finest auxiliaries for their circularizing and follow-up work, and TELEPHONY is most advantageously located at the center of the telephone field.

In short, no firm or individual catering to the telephone trade can afford to not be in TELEPHONY—simply because it is the most thorough and most economical investment they can possibly make.

Now is the time to get busy with your copy for our big Anniversary Number of January first—an edition of a very elaborate character, commemorating the commencement of our fifteenth volume. This, also, will be a special convention issue on account of the International Telephone Convention at Chicago, January 21-23, and the Electrical Exposition at Chicago, January 13-25. TELEPHONY will have a booth at this event, and every telephone man who calls there and presents his card will receive a copy of TELEPHONY free.

You will make no mistake in preparing strong copy of suitable size for this event. One firm has already reserved four pages for the big January Convention and Anniversary Number.

How much for you?

Printer's Affidavit

CHICAGO, ILL., November 23, 1907.

THIS IS TO CERTIFY that the undersigned printed and delivered for the Telephony Publishing Company, in excess of 10,000 copies of the November, 1907, issue of its publication "TELEPHONY."

R. G. GALUSHA, *Manager*, Western Newspaper Union.

Sworn to and subscribed before me this 23rd day November, 1907.

F. G. BROWN, *Notary Public.*

Our post-office receipts are on file in TELEPHONY's office for inspection.

Anchors, Guy.
Atlas Anchor Co., Cleveland.
D. & T. Anchor Co., La Crosse, Wis.
Durant Elec. Supplies Co., Chicago.
Jaekman, W. J., Lima, O.
Miller Anchor Co., Norwalk, O.

Arms, Telephone Transmitter.
Baird Mfg. Co., Chicago, Ill.
McDowell Mfg. Co., Pittsburg, Pa.

Attorneys, Patent.
Clement, E. E., Washington, D. C.

Batteries, Dry.
National Carbon Co., Cleveland, O.
Nungesser Electric Battery Co., Cleveland, O.
Rock Island Battery Co., Cincinnati, O.

Batteries, Storage.
Electric Storage Battery Co., Philadelphia, Pa.

Belts, Linemen's.
Otto Bunge, Indianapolis.

Boards, Power.
American Electric Telo. Co., Chicago, Ill.
Dean Electric Co., Elyria, O.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

Books, Telephone.
American School of Correspondence, Chicago.
Telephone Printing Co., Defiance, O.
Telephony Publishing Co., Chicago.

Booths.
Fisher-Stevens Co., Charles City, Ia.

Brackets.
Badger Pin Co., Wonewoc, Wis.
Bissell Co., The F., Toledo, O.
Central Tel. & Elec. Co., St. Louis, Mo.
Commercial Elec. Supply Co., St. Louis, Mo.
Locke Insulator Mfg. Co., Victor, N. Y.
Maine Hub & Mfg. Co., W. Sebooia, Me.
Oliver Mfg. Co., A. F., Buffalo, N. Y.
Palmetto Mfg. Co., Nashville, Tenn.
Peirce Specialty Co., Chcago, Ill.

Brass and Copper.
Scoville Mfg. Co., Chicago, Ill.

Bridle Rings.
Bissell & Co., Toledo.
Star Expansion Bolt Co., Bayonne, N. J.

Cabinets.
Cadwell Cabinet Co., Jamestown, N. Y.

Cables.
American Electric Telo. Co., Chicago.
American Electrical Works, Phillipsdale, R. I.
Bissell & Co., Toledo.
Brixey, W. R., New York.
Commercial Elec. Sup. Co., St. Louis, Mo.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
New York Insulated Wire Co., New York, N. Y.
Okonite Company, New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

Cable Clamps.
Diamond Expansion Bolt Co., New York, N. Y.

Cable Grips.
Mullin, Colman J., New York, N. Y.
Universal Cable Grip Co., Syracuse, N. Y.

Cable Hangers.
American Cable Clip Co., New York.
Yonkers Specialty Co., Yonkers, N. Y.

Cable Trolleys.
Bissell & Co., Toledo.

Calculagraphs.
Calculagraph Co., New York, N. Y.

Cable Reel Jacks.
Anderson Forge & Machine Co., Detroit.

Cable Winches.
Anderson Forge & Machine Co., Detroit.

Call Registers.
Baird Mfg. Co., Chicago, Ill.
Gray Telephone Pay Station Co., Hartford, Conn.

Celluloid Cards, Etc.
Felsenthal & Co., G., Chicago.

Cleats, Fibre.
Blake Signal & Mfg. Co., Boston, Mass.

Climbers.
Klein & Sons, Mathias, Chicago, Ill.
Oshkosh Logging Tool Co., Oshkosh, Wis.
Reidy, John J., New Haven, Conn.
Stephens, Wilmot, Binghamton, N. Y.

Clips, Cable.
American Cable Clip Co., New York.
Chase-Shawmut Co., Newburyport, Mass.
National Telephone Supply Co., Cleveland.

Clocks, Electrical.
American Clock Co., Chicago, Ill.

Coils, Induction.
American Electric Telephone Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyria, O.

Conduit, Underground.
American Sewer Pipe Co., Pittsburg, Pa.
Barnard & Co., B. S., New York, N. Y.
Camp Co., The H. B., New York.
Clay Products Co., Brazil, Ind.
Fibre Conduit Co., Orangeburg, N. Y.
McRoy Clay Works, Brazil, Ind.

Connectors.
American Electric Fuse Co., Muskegon, Mich.
Cook, Frank B., Chicago.
D. & W. Fuse Co., Providence, R. I.
Rolfe Elec. Co., Rochester, N. Y.
Yonkers Specialty Co., Yonkers, N. Y.

Contact Plugs.
The Scranton Button Co., Scranton, Pa.

Contractors.
Crumb & Co., W. H., Chicago, Ill.
General Engineering Co., Chicago, Ill.
Jones & Winter, Chicago, Ill.
Miller & McMeen, Chicago, Ill.

Condensers, Telephone.
American Electric Telo. Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Elec. Co., Elyria, O.

Edward E. Clement

Electrical Engineer
Patent Attorney

Investigation and Development of Inventions, Consultations, Reports, Patents and Patent Law.

OFFICE:
McGILL BUILDING, WASHINGTON, D. C.

SAMUEL G. McMEEN KEMPSTER B. MILLER

OUR BUSINESS is to make plans for telephone systems; to make studies and reports on proposed and existing telephone properties; to make tests and certificates concerning telephone apparatus and materials, and to solicit telephone patents in the United States and foreign countries. . . . .

McMeen & Miller

1454 to 1458 Monadnock Block, Chicago

Operator's Chair

An Ideal Chair

For Telephone Service

Easy, Durable, Stylish, Sanitary, Practical

As much BETTER THAN Ordinary Operator's Chairs as the Electric Arc Lamp is better than the Tallow Candle.

Has a broad, semi-flexible support for the back; a substantial, comfortable seat; and a convenient rest for the feet. In all respects an Ideal Operator's Chair. It helps you to improve your service. Write today for prices and descriptive matter.

Ask for our Circular on Telephone Operators' Chairs.

RICHARDS CHAIR PANEL CO.

1103-8 Woman's Temple, CHICAGO, U. S. A.

Andrews Steel Rod Telephone

Operator's Revolving Chair

No. 78 M.

Steel Foot Rest—Seat and Back readily adjustable to occupant—Height of Chair easily regulated. Frame work made of Bessemer Steel, ⅜ (three-eights) inch rods twisted and interwoven. Wood work, oak, birch or mahogany finish, as Preferred. Metal work heavily plated, Japanese copper finish.

The Most Comfortable High Chair Made

The Most Attractive and Convenient
INDESTRUCTIBLE
Nothing to get broken

24-inch high 28-inch high

Warranted for 10 years. Send for complete Catalogue and Prices.

No. 75 M.

Toll Board Chair

The A. H. Andrews Co.

174-186 Wabash Av., Chicago, U.S.A.

Illuminated Telephone Pay Station Signs

WE make a handsome, frosted-glass globe or canteen sign, especially adapted for use in public places, such as hotel lobbies, drug stores, cigar stands, etc. It can be attached to any 16-candle power electric light. The Independent shield in colors is placed on one or both sides as desired and the canteen is made in three diameters, eight, ten and sixteen inches, with or without flasher and with or without "goose-neck," as may be desired. Use this sign in front of your pay stations and watch your toll business grow. Sign not affected by weather conditions; will last indefinitely.

These Signs Draw Enough Business to Soon Pay for Themselves. They Draw it by Night When You are Best Prepared to Handle it.

SOLAR ELECTRIC CO., 161-163 S. Canal St., CHICAGO

Cords.
American Electrical Works, Phillipsdale, R. I.
Belden Mfg. Co., Chicago, Ill.
Premier Electric Co., Chicago.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

Correspondence Courses.
American School of Correspondence, Chicago.

Counters.
Baird Mfg. Co., Chicago, Ill.
Gray Telephone Pay Station Co., Hartford, Conn.
Veeder Mfg. Co., Hartford, Conn.

Cross Arms and Pins.
Badger Pin Co., Wonewoc, Wis.
Bissell Co., The F., Toledo, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Electric Co., St. Louis, Mo.
Commercial Elec. Supply Co., St. Louis, Mo.
Dearborn Electric Co., Chicago, Ill.
Knowles, C. S., Boston.
Lewis Lbr. & Mfg. Co., Hattiesburg, Miss.
Maine Hub and Manufacturing Co., West Sebools, Maine.
Northwestern Elec. Equipment Co., St. Paul, Minn.
Palmetto Mfg. Co., Nashville, Tenn.
St. Paul Elec. Co., St. Paul, Minn.
Southern Pine Mfg. Co., Paducah, Ky.

Diggers.
Anderson Forge & Machine Co., Detroit.
Oshkosh Logging Tool Co., Oshkosh, Wis.

Drills.
Kraeuter & Co., Newark, N. J.

Drop Forgings.
Anderson Forge & Machine Co., Detroit.

Duplex Sets.
Current Elec., Co., Chicago.

Engineers, Construction.
Crumb & Co., W. H., Chicago, Ill.
General Engineering Co., Chicago, Ill.
D. C. & Wm. B. Jackson, Boston and Chicago.
Jones & Winter, Chicago, Ill.
McMeen & Miller, Chicago, Ill.
Wilder, George W., Chicago, Ill.

Engravers.
Dearborn Engraving Co., Chicago, Ill.

Expansion Bolts.
Diamond Expansion Bolt Co., New York, N. Y.
Peirce Specialty Co., Elkhart, Ind.
Star Expansion Bolt Co., Bayonne.
Yonkers Specialty Co., Yonkers, N. Y.

Experts.
D. C. & Wm. B. Jackson, Boston and Chicago.
George W. Wilder, Chicago.

Fibre.
Diamond State Fibre Co., Wilmington, Dela.

Financial Agents.
W. F. Little & Co., St. Louis, Mo.

Fire Alarm (Telephone).
Denio General Electric Co., Rochester, N. Y.

Flexiphones.
Oliver Mfg. Co., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Chicago, Ill.

Galvanizers.
Hubbard & Co., Pittsburg, Pa.
National Galvanizing Co., Chicago.

Generators, Telephone.
American Electric Telephone Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyria, O.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
Holtzer-Cabot Co., Chicago.
Monarch Telephone Mfg. Co., Chicago.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.

Generators, Ringing.
Holtzer-Cabot Elec. Co., Chicago, Ill.
Sandwich Pole Changer Co., Sandwich, Ill.
Warner Electric Co., Muncie, Ind.

Ground Clamps.
American Cable Clip Co., New York.
Blackburn, George R., Cleveland.
Yonkers Specialty Co., Yonkers, N. Y.

Guy Clamps.
Cook, F. B., Chicago, Ill.

Hangers, Cable.
American Cable Clip Co., New York.
American Electric Fuse Co., Muskegon, Mich.
Bissell Co., The F., Toledo, O.
Central Electric Co., Chicago, Ill.
Chase-Shawmut Co., Newburyport, Mass.
Cook, F. B., Chicago, Ill.
National Telo. Supply Co., Cleveland, O.

G. Felsenthal & Company

219 East Van Buren Street
CHICAGO.

—Manufacturers of—

SPECIALTIES IN Celluloid

FOR

TELEPHONE COMPANIES

Instruction Cards, Name Plates, Etc., for Use on Transmitters or Coin Boxes

FINANCIAL

If you want financial assistance to enlarge or improve your property, or wish to sell

Write Us At Once

We make a specialty of financing Telephone Plants, Electric Light Plants, Street Railways, Gas and Water Works Properties. Purchase properties outright. Place bond issues and negotiate loans on same.

W. F. LITTLE & CO.

1112 Chemical Bldg. St. Louis, Mo.

Standard Underground Cable Co., Pittsburg, Pa.

Instruments, Measuring.
Weston Electrical Instrument Co., Newark, N. J.
Foote & Pierson, New York.

Insulating Material.
Candy & Co., Chicago, Ill.
New York Insulated Wire Co., New York, N. Y.
Runsel-Lens Elec. Mfg. Co., Chicago.
The Scranton Button Co., Scranton, Pa.
Standard Underground Cable Co., Pittsburg, Pa.

Insulators, China and Porcelain.
American Electric Fuse Co., Muskegon, Mich.
Central Electric Co., Chicago, Ill.

Insulators, Glass.
Hemingray Glass Co., Covington, Ky.

Iron, Norway.
Nash & Co., Geo., Chicago, Ill.
Stevens Co., Chas. G., Chicago, Ill.

Magnet Winding Machines.
Belden Mfg. Co., Chicago.

Manhole Cable Hangers.
Anderson Forge & Machine Co., Detroit.

Material, Construction.
American Electric Telo. Co., Chicago, Ill.
Anderson Forge & Machine Co., Detroit.
Andrae & Sons Co., Julius, Milwaukee, Wis.
B-R Elec. Mfg. Co., Kansas City, Mo.
Bigley Telo. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Elec. Supply Co., St. Louis, Mo.
Cook, F. B., Chicago, Ill.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Electric Co., Pittsburg.
Durant Elec. Supplies Co., Chicago.
Electric Appliance Co., Chicago.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
Hallett Iron Works, Chicago, Ill.
Illinois Electric Co., Chicago.
Klein & Sons, Mathias, Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Northwestern Elec. Equipment Co., St. Paul, Minn.
Oliver Mfg. Co., A. F., Buffalo, N. Y.
Oshkosh Logging Tool Co., Oshkosh, Wis.
Peirce Specialty Co., Chicago, Ill.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Telo. Mfg. Co., Rochester, N. Y.
Sumter Tel. Mfg. Co., Sumter, S. C.
Swedish-American Tel. Co., Chicago.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Woods Electric Co., Houston, Tex.

Material, Electroid.
The Scranton Button Co., Scranton, Pa.

Meters.
American Electric Telephone Co., Chicago, Ill.
Baird Mfg. Co., Chicago.
Gray Telephone Pay Station Co., Hartford, Conn.

Miniature Lamps.
General Electric Co., Harrison, N. J.

Motorcycles.
Armac Motorcycle Co., Chicago.

Mouthpieces.
General Insulate & Machine Co., Brooklyn, N. Y.
The Scranton Button Co., Scranton, Pa.

Nippers and Pliers.
Klein & Sons, Mathias, Chicago, Ill.

Ohmmeters.
Bissell Co., F., Toledo, O.
Weston Electric Instrument Co.

Operators' Chairs.
Andrews & Co., A. H., Chicago, Ill.
Davis Chair Co., Marysville, O.
Richards Chair Panel Co., Chicago.
N. J.

Paste, Soldering.
American Cable Clip Co., New York.

Pay Stations.
Baird Mfg. Co., Chicago.
Gray Telephone Pay Station Co., Hartford, Conn.

Pins, Insulator.
Badger Pin Co., Wonewoc, Wis.
Bissell Co., The F., Toledo, O.
Maine Hub & Mfg. Co., W. Seboois, Me.
The Scranton Button Co., Scranton, Pa.

"Simplex" Ground Connector

Pat. Applied for.

The only scientific and perfect Ground Connector on the market. Made from copper, tinned on both sides. Will fit any size pipe, sewer, water or gas.

The only ground connector that can be thoroughly excluded from atmospheric influences.

Samples furnished on request.

The American Cable Clip is stated by competent judges to be the "BEST."

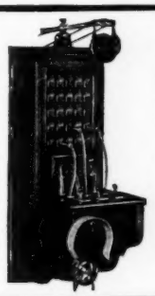
Manufactured only by the

AMERICAN CABLE CLIP CO.

132 PRINCE STREET :: :: NEW YORK

FARR TELEPHONE AND CONSTRUCTION SUPPLY CO.

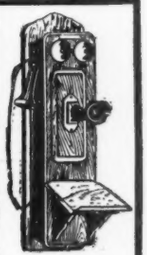
118-120 W. Jackson Boulevard, Chicago



Catalogue No. 20 is ready. Write for one at once.

Telephones, Switchboards, Wire, Cross Arms, Pins, Insulators, Electric Light Supplies, Etc.

We Guarantee All of Our Goods.



No 14

NORTHWESTERN ELECTRIC EQUIPMENT

181-189 E. Fourth St. CO. ST. PAUL, MINN.

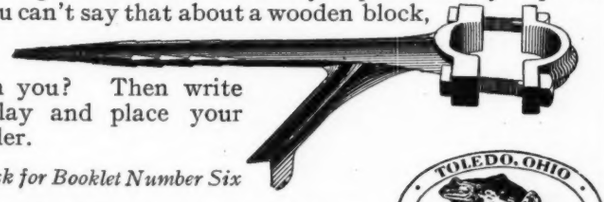
Our Specialties

Am. Steel & Wire Co.'s Galv. Telephone Wire, Security Pole Houses, Security Cable Devices, Hemingray Insulators, Washington Fir Cross Arms.

SEND FOR OUR NEW TELEPHONE SUPPLY CATALOGUE

Why Not Install Security Pot Head Brackets

They're Strong, Adjustable, and Cheap in Price.
A tap of the hammer and they're permanently in place.
You can't say that about a wooden block,



can you? Then write today and place your order.

Ask for Booklet Number Six

THE F. BISSELL COMPANY
TOLEDO, O.

TOLEDO, OHIO
THE F. BISSELL COMPANY

"Everything Telephonic That's First Class"

Woods Electric Company

505 Travis St., HOUSTON TEX.

Jobbers of

Telephone Apparatus and Supplies

Big Stock Quick Shipments
Square Business Treatment

Michigan White Cedar Poles

(The Kind with the Big Butts)

IMPORTANT

The thoughtful Manager has figured out that on account of the large Butts on our poles that he buys twice the **"Pole Life"** when he buys **DAVIDSON-GALLMEYER POLES** compared with Western Poles having the same top and dimensions. Through careful inspection and from the fact that our poles are loaded directly on cars at our camps without the added expense of yarding we are able to deliver a first quality pole f. o. b. your station at a very close figure. We assure you that if you are in the market for poles, you have not properly served your own interests if you have failed to get our latest quotations. Courteous attention will be given to all your inquiries, and it has been our experience that a sample order secures us a permanent customer.

DAVIDSON-GALLMEYER LUMBER COMPANY
TOLEDO, OHIO

WHITE CEDAR POLES

We have a large stock of well-seasoned Poles in our yards in Northern Minnesota which we wish to reduce to make room for new stock coming in during the winter.

In order to do so we are making Attractive Prices for

IMMEDIATE SHIPMENT

We have a full assortment, including
LARGE LOTS OF LONG POLES

YARDS AT Deer River and Cohasset, Minn.
GENERAL OFFICE: 918-919 Lumber Exchange, Minneapolis, Minn.

J. W. Morrison Lumber Company

HUBBARD & COMPANY

PITTSBURG, PA.

MANUFACTURERS OF

POLE LINE HARDWARE

ALL GALVANIZING BY THE

HOT DIPPED PROCESS

Guaranteed to Stand the American Telephone and Telegraph Company's Four Immersion Test

WESTERN OFFICE, 417 Fisher Building, CHICAGO, ILL.

PLATINUM

CROSELMIRE & ACKOR CO.

Factory and Main Office: 42 Walnut St., Newark, N. J.
New York Office: 10 East 23rd Street.
Chicago Office: 1023 Chicago Stock Exchange Bldg. Telephone Main 3924

M. LANZ & SONS

Manufacturers of

POLE LINE HARDWARE

Plain and Hot Galvanized PITTSBURG, PA.

PRESSED STEEL

Telephone Transmitter Arms and Bases

¶ Transmitter Arms of pressed steel are superior for their lightness, strength and beauty, and permanency of finish.
¶ These features lead to our making pressed steel cabinets for Hotel Sets, Extension Bell Boxes, steel bases for Desk Sets, Relay Shells, and other pressed steel specialties to take the place of small castings.

SPECIFY THEM IN YOUR PURCHASES.

McDowell Manufacturing Company
541 Wood Street, PITTSBURG, PA.

Pipe Bends.
Anderson Forge & Machine Co., Detroit.

Platinum.
Baker & Co., Inc., Newark, N. J.
Croselmire & Ackor, Newark, N. J.

Poles, Cedar.
Beidler & Co., Francis, Chicago, Ill.
Bissell Co., The F., Toledo, O.
Davidson-Gallmeyer Lumber Co., Toledo, O.
Davison & McBryde, Nashville, Tenn.
Duluth Log Co., Duluth, Minn.
Humbird Lumber Co., Sand Point, Idaho.
Itasca Cedar Co., Deer River, Minn.
Lindsley Bros. Co., Spokane, Wash.
Mason, Edw. Z., Buffalo, N. Y.
Morrison Lbr. Co., J. W., Minneapolis, Minn.
Wm. Mueller Co., Blaney, Mich.
National Pole Co., Escanaba, Mich.
Naugle Pole & Tie Co., Chicago, Ill.
Nebraska Bridge Supply & Lumber Co., Omaha.
Pacific Coast Pole Co., Spokane.
Page & Hill Co., Minneapolis, Minn.
Partridge Lbr. Co., T. M., Minneapolis, Minn.
Pendleton & Gilkey, Minneapolis.
Raber & Watson, Chicago, Ill.
Sand Point Lumber & Pole Co., Ltd., Sand Point, Idaho.
Sterling & Son, W. O., Monroe, Mich.
Valentine-Clark Co., Chicago, Ill.
Vogel, Herman, Clark Fork, Idaho.
Wagner Shingle Co., G. N., Grand Rapids, Mich.
Western Lumber & Pole Co., Denver, Colo.
Wittenberg Cedar Co., Wittenberg, Wis.
Worcester Co., C. H., Chicago, Ill.

Poles, Chestnut.
Crescent Lumber Co., Pittsburg.
Nashville Tie & Cedar Co.
Paducah Pole & Timber Co., Paducah, Ky.
A. L. Potter & Co., Norwich, Conn.
Stevenson, Guy, Byer, O.

Poles, Cypress.
Crescent Lumber Co., Pittsburg.

Poles, Juniper.
Houston & Liggett, Lewisburg, Tenn.

Pole Cable Switch.
American Cable Clip Co., New York.

Pole Changers.
Current Elec., Co., Chicago.
Sandwich Pole Changer Co., Sandwich, Ill.
Warner Electric Co., Muncie, Ind.

Pole Houses.
F. Bissell Co., Toledo.
Northwestern Elec. Equipment Co., St. Paul, Minn.

Pole Raising Wagons.
Anderson Forge & Machine Co., Detroit.

Pole Seats.
Anderson Forge & Machine Co., Detroit.
F. Bissell Co., Toledo.

Printing, Books, Forms, Etc.
Dinsmore & Lawton, Chicago.
Sandwich Pole Changer Co., Sandwich, Ill.
Telephone Printing Co., Defiance, O.
Telephone Review Publishing Co., Chicago, Ill.

Protectors, Telephone.
American Electric Fuse Co., Muskegon, Mich.
American Electric Telephone Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Central Tel. & Elec. Co., St. Louis
Chicago Telephone Supply Co., Elkhart, Ind.
Cook, F. B., Chicago, Ill.
Commercial Elec. Supply Co., St. Louis, Mo.
Moon Mfg. Co., Chicago, Ill.
Oliver Mfg. Co., A. F., Buffalo, N. Y.
Rolfe Elec. Co., Rochester, N. Y.
Sterling Electric Co., Lafayette, Ind.

Receiver Cases.
General Insulate & Machine Co., Brooklyn, N. Y.
The Scranton Button Co., Scranton, Pa.

Receivers, Telephone.
Oracraft-Leich Elec. Co., Genoa, Ill.
Murdock, W. J., Chelsea, Mass.

Reels, Ready Pay Out.
Oshkosh Logging Tool Co., Oshkosh, Wis.

Revolution Counters.
Belden Mfg. Co., Chicago.

Seals, Incorporation.
Middleton & Co., J. W., Chicago, Ill.

Signs, Telephone.
Solar Electric Co., Chicago.

SQUARE WASHERS

We manufacture square washers of all sizes and can quote you rock bottom prices on both plain and galvanized.

Write for Prices.

HALLETT IRON WORKS

Manufacturers of Telephone and Telegraph Construction Material.

92-96 W. POLK STREET, CHICAGO, ILLINOIS.

TELEPHONE PRINTING

We handle a complete line of

FORMS FOR OPERATING COMPANY'S USE

Prepared for us by Telephone Experts and exactly suited to your needs.

OUR TREMENDOUS OUTPUT

In this Line means

LOWEST POSSIBLE PRICES

TO YOU

Tell us your Requirements and LET US QUOTE YOU

Telephone Review Publishing Company

2286 Kenmore Avenue, CHICAGO

Sleevings.
Belden Mfg. Co., Chicago.

Solder, Self-Fluxing.
Belden Manufacturing Co., Chicago.
Blake Signal & Mfg. Co., Boston.

Specialties, Telephone.
Baird Mfg. Co., Chicago, Ill.
Gray Telephone Pay Station Co., Hartford, Conn.
Veeder Mfg. Co., Hartford, Conn.

Staples, Insulated.
Blake Signal & Mfg. Co., Boston, Mass.
The Scranton Button Co., Scranton, Pa.

Steel, Magnet.
Nash & Co., Geo., Chicago, Ill.
Stevens Co., Chas. W., Chicago, Ill.

Safety Straps.
Otto Bunge, Indianapolis.

Supplies, Telephone.
American Electric Fuse Co., Muskegon, Mich.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
B-B Elec. Mfg. Co., Kansas City.
Bigley Telo. Co., Chicago, Ill.
Baird Mfg. Co., Chicago, Ill.
Bissell Co., F., Toledo, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis.
Chase-Shawmut Co., Newburyport, Mass.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Elec. Sup. Co., St. Louis, Mo.
Cook, F. B., Chicago, Ill.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyra, O.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Electric Co., Pittsburg.
Durant Elec. Supplies Co., Chicago.
Electric Appliance Co., Chicago.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
Farr Telephone & Construction Supply Co., Chicago, Ill.
Hubbard & Co., Pittsburg, Pa.
M. Lanz & Sons, Pittsburg, Pa.
Long Distance Tele. Mfg. Co., South Bend, Ind.
Mountain State Elec. Co., Wheeling, W. Va.
National Telo. Supply Co., Cleveland, Ohio.
North Electric Co., Cleveland, O.
Peirce Specialty Co., Chicago, Ill.
Premier Electric Co., Chicago.
The Scranton Button Co., Scranton, Pa.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swedish - American Telephone Co., Chicago, Ill.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telo. Mfg. Co., Chicago, Ill.
Woods Electric Co., Houston, Tex.

Switchboards, Automatic Telephone.
Automatic Electric Co., Chicago, Ill.

Switchboards, Common Battery.
American Electric Telephone Co., Chicago, Ill.
Century Telephone Construction Co., Buffalo.
Chicago Telephone Supply Co., Elkhart, Ind.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyria, O.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
International Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Western Telo. Mfg. Co., Chicago, Ill.
Woods Electric Co., Houston, Tex.

Switchboards, Magneto.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Central Tel. & Elec. Co., St. Louis, Mo.
Century Telephone Construction Co., Buffalo.
Chicago Telephone Supply Co., Elkhart, Ind.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyria, O.
Electric Appliance Co., Chicago.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
Farr Telephone & Construction Supply Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Monarch Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

December Is a Good Month

in which to buy SECURITY POLE SEATS

And so are any of the other eleven months. For no matter the time of year, you can always secure the same great strength, the same light weight, the same neatness, and the same low price that have made for Security Pole Seat, Popularity.

Get the Security Booklet Number Six.

THE F. BISSELL COMPANY. TOLEDO. O.

How to Open a Joint

The method of making a joint (in telephone cable) that can be opened and its advantages for testing and changing multiples are described and illustrated in a vest pocket booklet. Sent free.

Write to

W. N. Matthews & Bro.

220 N. 2nd Street **St. Louis**

Idaho Cedar Poles

Large Stock. Best Quality. Prices Right. . . . . Write to us before purchasing elsewhere.

HERMAN VOGEL

CLARK FORK, IDAHO

CHESTNUT AND OAK PILING

Chestnut Telephone and Telegraph Poles

ALBERT L. POTTER & CO.

Prompt Deliveries. **NORWICH, CONN.**

DOUBLE ARMING THAT'S PERMANENT

is secured when you use SecurityDouble Arming Braces.

Not only that, but they're stronger, cheaper, look better and are easier to instal than the old way. Why not place a sample order today?

Ask for Booklet Number Six.

THE F. BISSELL COMPANY TOLEDO. O.

THE POLE QUESTION

IDAHO AND MICHIGAN CEDAR

has terrors leos to the buyers of Bissell Pn oo f they are assured not only quick shipments but the highest quality attainable together with the lowest prices.

Ask for Leaflet Number Six

THE F. BISSELL COMPANY. Toledo, O.

We Carry For Immediate Shipment

Capital High Speed Steel	Oil Tempered Wire
Capital High Speed Twist Drils	Music Wire
Eagle & Globe Tool and Die Steel	Tinned Wire
Solar Tool Steel	Cast Steel Binding Wire
Self Hardening Steel	Acme Resistance Wire
Forged Die Blocks	Coppered Bessemer Rods
Spring Steel Sheets	Cold Rolled Shafting
Crucible Cold Rolled Steel	Cold Drawn Screw Rods
Hardened and Tempered Strips	Cold Drawn Shapes
Drill Rods	Cold Drawn Norway Iron
Dental Octagons	Cold Rolled Flat Wire
Roller Bearing Rods	Coiled Springs

Send for Catalogue of Nash Salt Bath Tempering Furnace and our Steel Catalogue.

GEO. NASH CO.

NEW YORK, 217 Pearl St. CHICAGO, 115 W. Washington St.

Cold Rolled Drawing and Stamping Steel

We Know That We Can Save You Money

If You Are a Buyer of Locust Pins or Long Leaf Yellow Pine Cross Arms

That's a pretty strong statement, but no matter what quality you demand, no matter the shipment you desire, we have the stocks, the grade, and special prices that will land your order.

Write today and get Leaflet Number Six

THE F. BISSELL COMPANY. TOLEDO, O.

CHESTNUT POLES

are stronger, last as long, and cost less than other poles.

I HAVE 7,500 IN STOCK

GUY STEVENSON, Byer, Ohio

Chestnut Poles
and
Cypress Poles

CRESCENT LUMBER CO. PITTSBURG, PA.

FOR CEDAR POLES

Write

G. N. WAGNER LUMBER AND SHINGLE CO.

923 Michigan Trust Building

GRAND RAPIDS, :: :- MICHIGAN

Long Leaf Yellow Pine Cross Arms

SPLENDID STOCK. PROMPT SHIPMENTS

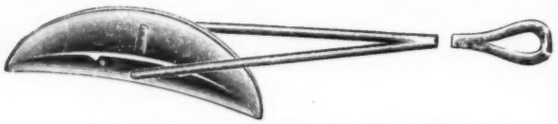
We make a specialty of all heart stock and of special sizes. Would like to have your inquiries.

THE LEWIS LBR. & MFG. CO.

HATTIESBURG MISSISSIPPI

"THEY NEVER PULL UP"

THE MILLER SAFETY ANCHOR



Ask Nearest Jobbing House for Prices.
One Dozen on Trial. Freight Prepaid.
Write for Catalogue.

THE MILLER ANCHOR CO.
NORWALK, OHIO

Swedish - American Telephone Co., Chicago, Ill.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Woods Electric Co., Houston, Tex.

Tape.

New York Insulated Wire Co., New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.

Telephones, Adjustable.

American Electric Telephone Co., Chicago, Ill.
Oliver Mfg. Co., Philadelphia, Pa.

Telephones, Automatic.

American Automatic Telo. Co., Rochester, N. Y.
Automatic Electric Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.

Telephones, Common Battery.

American Electric Telephone Co., Chicago, Ill.
Century Telephone Construction Co., Buffalo.
Chicago Telephone Supply Co., Elkhart, Ind.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyria, O.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
International Telephone Mfg. Co., Chicago, Ill.
Long Distance Tele. Mfg. Co., South Bend, Ind.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telo. Mfg. Co., Chicago, Ill.
Wire & Telo. Co., Rome, N. Y.
Woods Electric Co., Houston, Tex.

Telephones, Intercommunicating.

Corwin Telephone Mfg. Co., Chicago, Ill.
Premier Elec. Co., Chicago.
Stromberg-Carlson Telo. Mfg. Co., Rochester, N. Y.

Telephones, Lock Out.

Baird Mfg. Co., Chicago, Ill.
Roberts Telephone Co., Homer, Chicago, Ill.

Telephones, Magneto.

American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Baird Mfg. Co., Chicago, Ill.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Century Telephone Construction Co., Buffalo, N. Y.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Electric Supply Co., St. Louis, Mo.
Cracraft-Leich Elec. Co., Genoa, Ill.
Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Electric Co., Pittsburg.
Electric Appliance Co., Chicago, Ill.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
Farr Telephone & Construction Supply Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Long Distance Tele. Mfg. Co., South Bend, Ind.
Monarch Telephone Mfg. Co., Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Swedish-American Telephone Co., Chicago, Ill.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Wire & Telo. Co., Rome, N. Y.
Woods Electric Co., Houston, Tex.

Telephone Parts.

American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Ericsson Telephone Mfg. Co., L. M., Buffalo, N. Y.
Gray Telephone Pay Station Co., Hartford, Conn.
Monarch Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
The Scranton Button Co., Scranton, Pa.
Sterling Electric Co., Lafayette, Ind.
Sumter Telo. Mfg. Co., Sumter, S. C.

Eventually

Atlas Anchors

Why not now?

The Atlas Anchor Company
Cleveland, Ohio

Specimen pages from TELEPHONY'S Mailing List sent upon request.

INSULATING TAPES AND CEMENTS

We are the largest manufacturers in the world of these articles, and can give your orders prompt attention. Write us.

MASSACHUSETTS CHEMICAL COMPANY, WALPOLE, MASS.

OPERATES—WALPOLE RUBBER WORKS—WALPOLE VARNISH WORKS

Swedish-American Telephone Co., Chicago, Ill.
Vote-Berger Co., La Crosse, Wis.
Western Telo. Mfg. Co., Chicago, Ill.
Wire & Telo. Co., Rome, N. Y.

Telephone Repairing.

Bigley Telo. Co., Chicago, Ill.

Telephones—Second-hand.

Bigley Telo. Co., Chicago, Ill.

Testing Clamps.

American Cable Clip Co., New York.
Yonkers Specialty Co., Yonkers, N. Y.

Testing Clips.

Frankel Display Fixture Co., New York, N. Y.

Terminals—Cable.

American Electric Telo. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Cook, F. B., Chicago, Ill.
Protective Electrical Supply Co., Ft. Wayne, Ind.
Moon Mfg. Co., Chicago, Ill.

Time Stamps.

American Clock Co., Chicago, Ill.
Baird Mfg. Co., Chicago, Ill.
Calculagraph Co., New York. N. Y.

Tools, Construction.

Anderson Forge & Machne Co., Detroit, Mich.
Bissell Co., The F., Toledo, O.
Doubleday-Hill Electric Co., Pittsburg.
Hubbard & Co., Pittsburg, Pa.
Illinois Electric Co., Chicago, Ill.
Klein & Sons, Mathias, Chicago, Ill.
Mack & Co., Rochester, N. Y.
Oshkosh Logging Tool Co., Oshkosh, Wis.
The Scranton Button Co., Scranton, Pa.

Tools, Linemen's.

Illinois Electric Co., Chicago, Ill.
Klein & Sons, Mathias, Chicago, Ill.
Mack & Co., Rochester, N. Y.
Oshkosh Logging Tool Co., Oshkosh, Wis.

Voltmeters.

Illinois Electric Co., Chicago, Ill.
Weston Electrical Instrument Co., Newark, N. J.

Wax.

Candy & Co., Chicago, Ill.
Faultless Insulating Compound Co.

Wire, Copper.

American Electrical Works, Phillipsdale, R. I.
American Insulated Wire & Cable Co., Chicago, Ill.
Duplex Metals Co., New York.
Manhattan Electrical Sup. Co., Chicago, Ill.
Roebling & Sons Co., John A., Trenton, N. J.
Scovill Mfg. Co., Chicago, Ill.
Standard Underground Cable Co., Pittsburg, Pa.
Sterling Insulated Wire Co., 240-244 W. Lake St., Chicago.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Galvanized Iron.

Indiana Steel & Wire Co., Muncie, Ind.
Monarch Elec. & Wire, Chicago, Ill.
Northwestern Elec. Equipment Co., St. Paul, Minn.
Roebling's Sons Co., John A., Trenton, N. J.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Magnet.

Belden Manufacturing Co., Chicago, Ill.
Griffin, Frank B., Oshkosh, Wis.
Runzel-Lenz Elec. Mfg. Co., Chicago, Ill.
Standard Underground & Cable Co., Pittsburg, Pa.
Stromberg-Carlson Telo. Mfg. Co., Rochester, N. Y.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Strand.

Roebling's Sons Co., John A.. Trenton, N. J.
Standard Underground & Cable Co.. Pittsburg, Pa.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Telephone Switchboard.

Belden Manufacturing Co., Chicago, Ill.
National India Rubber Co., Bristol, R. I.
Runzel-Lenz Elec. Mfg. Co., Chicago, Ill.
Premier Electric Co., Chicago, Ill.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Weatherproof.

American Insulated Wire & Cable Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Brixey, W. R., New York, N. Y.
Central Electric Co., Chicago, Ill.
Dearborn Electric Co., Chicago, Ill.
Detroit Insulated Wire Co., Detroit, Mich.
Durant Elec. Supplies Co., Chicago.
Marion Insulated Wire & Rubber Co., Marion, Ind.
National India Rubber Co., Bristol, R. I.
New York Insulated Wire Co., New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.
Sterling Insulated Wire Co., 240-244 W. Lake St., Chicago.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Rubber Covered.

American Insulated Wire & Cable Co., Chicago, Ill.
Dearborn Electric Co., Chicago, Ill.
Durant Elec. Supplies Co., Chicago.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
Marion Insulated Wire & Rubber Co., Marion, Ind.
National India Rubber Co., Bristol, R. I.
New York Insulated Wire Co., New York, N. Y.
Okonite Company, New York, N. Y.
Runzel-Lenz Elec. Mfg. Co., Chicago, Ill.
Standard Underground & Cable Co., Pittsburg, Pa.
Sterling Insulated Wire Co., 240-244 W. Lake St., Chicago.
Wire & Telo. Co. of America, Rome, N. Y.

Woodwork.

American Electric Fuse Co., Muskegon, Mich.
Sumter Telo. Mfg. Co., Sumter, S. C.

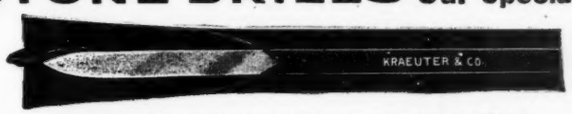
W. H. Crumb & Company
ENGINEERS—CONTRACTORS
Telephone Engineering and Construction
Plans, Specifications and Estimates Promptly Furnished.
835 Monadnock Bldg. - CHICAGO

D. C. & WM. B. JACKSON
MEMBERS AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS
AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AMERICAN SOCIETY OF CIVIL ENGINEERS
ENGINEERS EXPERTS
CHICAGO BOSTON

GEORGE W. WILDER, Ph. D.
CONSULTING TELEPHONE ENGINEER
Monadnock Block CHICAGO

J. W. MIDDELTON & CO.
TELEPHONE STOCK CERTIFICATES.
NEW ELEGANT STEEL VIGNETTES.
Publishers of **Inter-State Corporation Record** containing all Forms and Blanks for Organizing a New Corporation.
Stock Certificates, Bonds, Corporate and Notarial Seals. Blank Books, Printing, Lithographing.
167-169 DEARBORN STREET, CHICAGO.

1908—LEASE RECORDS—1908
For next year get the best—that's our "New Form"
Many companies are now using it, and all are pleased. Ask for circular describing it. Order early and avoid the rush. We also furnish—
Toll Tickets Toll Journals Toll Ledgers Monthly Check Reports Cash Books
Directories Trouble Tickets Rental and Toll Bills Voucher Checks
Letter Heads Card Index Systems Steel Telephone Signs
All kinds of blanks, books and forms for Telephone and Toll Line Accounting.
——Write for sample forms and prices.——
TELEPHONE PRINTING COMPANY, :: :: :: DEFIANCE, OHIO

STONE DRILLS Our Specialty


Get them with our name on from your dealer, or direct
KRAEUTER & CO. 577-579 18th Ave., NEWARK, N. J.

Insulated Staples

Pat. Nov. 1900

BLAKE Tube Flux for Soldering
Full Size of Tube 1" x 5"

WRITE FOR SAMPLES
Blake Signal & Mfg. Co., 246 Summer St., Boston, Mass.

Compressed Cleats

TELEPHONY leads; always has led; always will lead.

DEC 2 1907

CLASSIFIED ADVERTISEMENTS

And want advertisements not exceeding twenty words exclusive of address, will be inserted in these columns for $1.00 each. over twenty words the rate will be 5 cents per word.

WASHERS "SPECIAL SIZES."—In any quantity, metal or fibre. We also make dies, do all kinds of stamping, screw machine work and light machine work. Quadriga Mfg. Co., 16-18 So. Canal St., Chicago, Ill.

WANTED—Position by all around telephone man. Best of references as to habit and experience. Address, Box 152, Fairmont, Minn.

WANTED—A telephone position by an all around telephone man of ten years' experience, and a graduate of the I. C. S. Address No. 455, care TELEPHONY.

FOR SALE—Good telephone exchange and residence; good town and country; income $220 month; residence worth $2,200; both for $7,500. Address Chas. McMurry, Toron, Kansas.

FOR SALE or trade for land, a paying telephone exchange, 300 phones, 30 miles toll line; receipts $475.00 per month; located in eastern Kansas. Address 454, care TELEPHONY.

FOR SALE—One telephone system, 25 phones, about 200 miles pole lines, four switchboards; price $40 per phone; 60% cash, balance on year's time. Write, T. F. Poole, Grainfield, Kans.

If needing an all around telephone man with ability as electrician and manager, write me. Can pay dividends; satisfaction guaranteed. Address Post Office Box 187, Sullivan, Ill.

WANTED—Position with a telephone company in engineering department or as a wire chief. Two years' college education and seven years of experience. Address No. 456, care TELEPHONY.

FOR SALE—One International Correspondence School Telephone Engineering Coure, including bound volumes. Will sell at half price for cash. Address W. R. P., 6670 Hartwell Ave., Chicago, Ill.

STYLOGRAPHIC and FOUNTAIN PENS are indispensable to telephone people. If you have none, write for catalogue. Agents wanted. J. Ullrich & Co., Mfrs., Dept. 49, 27 Thames St., New York, N. Y.

FOR SALE—200 Magneto telephones. Have changed system to common battery, therefore must sell these telephones at once very cheap. Address Oswego County Independent Telephone Co., Fulton, N. Y.

FOR SALE—Three sections of American Electric Switchboard, 100 drops each, magneto type, and in good condition. Will sell at a very reasonable figure. Address The Wellington Telephone Co., Wellington, Ohio.

WANTED—A position in a telephone engineering firm by a university technical graduate with over four years of wide experience and study in practical telephone work. Address No. 458, care TELEPHONY.

FOR SALE—500 Stromberg-Carlson central energy wall telephones, golden oak cabinets, 1,000 ohm ringers. All in first-class condition. Address Kansas City Home Telephone Co., 1018 Baltimore Ave., Kansas City, Mo.

EXCEPTIONAL BUSINESS OPPORTUNITY for practical telephone man with some capital to invest in new construction and manage an Independent telephone system of exchanges, toll lines and 500 telephones connecting six towns in a growing, prosperous wheat and timber country. Address 315 Empire State Building, Spokane, Wash.

FOR SALE—An Independent telephone plant in the heart of the No. 2 hard wheat belt of Kansas; good society, schools and churches; one hundred and sixty local phones, thirty-five miles toll lines, twenty miles farm lines, good construction, mostly new, monthly income $295.00, price $10,000.00. Reason for selling, wife's health and other business. Address J. 16, care TELEPHONY.

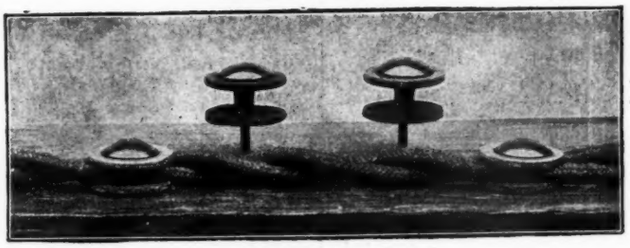
Telephone engineer is open for engagement in manufacturing, operating or installation; 25 years' experience in automatic and all manual systems. Address 459, TELEPHONY.

PATENTS—H. W. T. Jenner, patent attorney and mechanical expert, 608 F street, Washington, D. C. Established 1883. I make free examination and report if patent can be had, and exactly how much it will cost. Send for circular.

WANTED—Fifty students for instruction in practical telephony by experienced engineer. Students graded according to present knowledge; special price till December 31, fifty cents per lesson. School of Telephony, Box 1135, Oklahoma City, Okla.

FOR SALE—Controlling interest in an Independent telephone company in Texas; capital stock $40,000. The company has no debts, bonds or other liabilities. Active man with some capital can double the business. Owner of stock too far advanced in years to give business attention. Will consider Buffalo or Chicago real estate as trade. Address No. 457, care TELEPHONY.

Let Us Tell You Why **Eureka Fibre Insulators** Are Superior for Attaching All Inside Wires

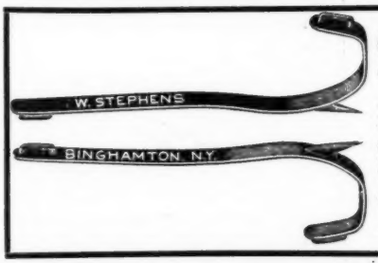


PATENTS ALLOWED.

The many large orders already received have practically swamped our present capacity, but we are arranging to install new automatic machinery and greatly enlarge our capacity so as to handle properly all orders for future delivery.

Prices, Particulars and Samples on Request

EUREKA SUPPLY CO., CAMDEN, NEW JERSEY



CLIMBERS

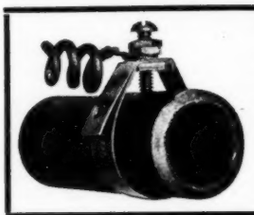
Best in the World

My 25 years in the business and the universal reputation of my goods are sufficient proof of above claim.

Write for particulars and prices.

WILMOT STEPHENS

16 Mitchell Av., Binghamton, N.Y.



Three years ago we received the first order for

Blackburn Ground Clamps

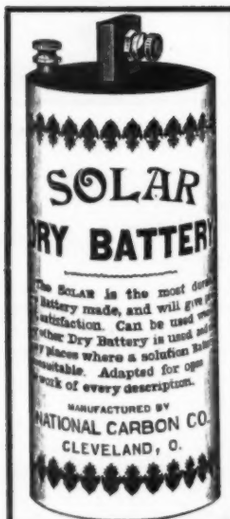
from one of the largest telephone companies in the United States.

This same company has used 15,000 of our clamps since that time. WHY? because they give satisfaction.

Let us send you a sample.

GEO. R. BLACKBURN

1967 E. 55th Street CLEVELAND, OHIO



IN ADDITION

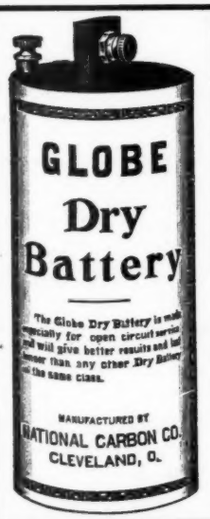
TO THE COLUMBIA BATTERY

WE MANUFACTURE

SOLAR AND GLOBE

Dry Cells which we can furnish at the following prices:

SOLAR, bbl. lots at $12.50 per hundred
GLOBE, bbl. lots at 9.50 per hundred
F. O. B. FACTORY



NATIONAL CARBON COMPANY :: :: CLEVELAND, OHIO

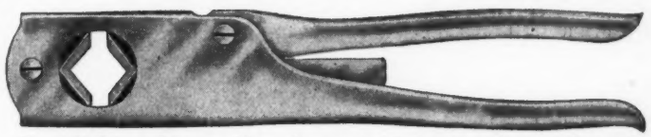
A. T. & T. Steel 3-Bolt Guy Clamp

Hot Galvanized

In pulling test this clamp will break the best grade of $\frac{3}{8}$″ strand without slipping. Write for prices.

National Telephone Supply Co., Manufacturers, **Cleveland, Ohio**

PORCELAIN TUBE AND CARBON CUTTER



THIS tool is so designed that pressure is applied to the tube equally at four points, thereby causing the tube to snap off at any point where pressure is applied. By using this tool there will be no wasting of tubes. It needs no sharpening and is made in a convenient size to carry, weighing only fourteen ounces. Made adjustable to $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ inch tubes or any size of arc-light carbons. No wireman's kit is complete without it.

Nickel-Plate Finish, Price $2.50

Sole Manufacturers HAGSTROM BROTHERS MANUFACTURING CO., Lindsborg, Kansas

NEW YORK OFFICE, SMITH & HEMENWAY CO., 108-110 Duane Street, NEW YORK CITY

Manufacturers of the Largest and Most Complete Line of Pliers, Nippers and Linemen's Tools in the World. If interested in same, write them direct for a copy of their Electrical Section.

SCOVILL MFG. CO.

210 LAKE STREET :-: CHICAGO

Sheet Brass of all Tempers
Brass Rod, Wire and Tubing
Special Spring German Silver for Telephone Work

Estimates Given on Telephone Parts or Special Articles of Brass, Copper, German Silver or Aluminum

Manufacturers of HARD and FLEXIBLE FIBRE

For ELECTRICAL INSULATION & MECHANICAL PURPOSES

DIAMOND STATE FIBRE COMPANY
ELSMERE
U.S.A.
DELAWARE

Made in SHEETS. RODS. TUBES. WASHERS. DISCS and SPECIAL SHAPES

COLORS: RED, GREY and BLACK. Write for Estimates

Cords of QUALITY

wear well—better than others

WRITE FOR PRICES AND SAMPLES
ASK FOR BOOKLET No. 114

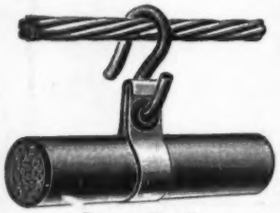
Stromberg-Carlson Tel. Mfg. Co., CHICAGO, ILL. ROCHESTER, N. Y.

AMERICAN ELECTRIC TELEPHONE CO., Chicago

WE ISSUE THE FOLLOWING BULLETINS AND CATALOGUES

Bulletin No. 7—Combined Telephone and Switchboard.
" " 8—Wall Switchboard.
" " 9—Samson Telephone.
" " 10—American Exoress Switchboards.
" " 11—Desks—Toll and Private Branch.
" " 12—Visual Signal and Bell Style Switchboards.
" " 13—Intercommunicating Systems.
" " 14—Line Material and Supplies.
Bulletin No. 15—Bell Express Self-Restoring Switchboards.
" " 16—Operator's Set and Accessories.
" " 17—Parts of Apparatus,
" " 18—Magneto Telephones of all kinds.
" " 19—Central Energy Switchboards.
" " 20—Central Energy Telephones.
" " 21—Protective Apparatus and Terminal Equipment.
Bulletin No. 22—Construction of Country Telephone Lines.
" " 23—Eight-Party Selective Ringing Telephones.
" " 24—Composite Telephone and Telegraph Lines.
" " 25—Four-Party "Leich" Selective Telephone System.
" " 26—Telephone Power and Ringing Equipment.

WE SEND THEM POSTPAID. WRITE FOR THEM.



Patents Pending

"I-Let" Metallic Cable Hanger

Why use marline hangers when you can buy this at the same price

The "I-LET" hanger consists of a zinc strap in combination with the standard galvanized "S" hook. This is the most durable combination known for supporting aeriel cables. It is far better in every way than the old fashioned marline hanger, and is sold at "marline" prices. It is also the best value ever offered in this line of telephone material.

The strap of the "I-LET" hanger is reinforced by standard brass eyelets and locked in such a manner that it cannot be detached from the cable. It combines great mechanical strength with efficiency. Hooks are re-galvanized, as per standard specifications.

SIZES

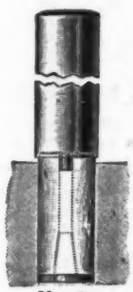
Standard size has 4½" strap, equivalent to 10" marline loop, and fits 1" diameter cable. A charge of 50c is made for each additional inch in length of strap. In ordering, state diameter of cable or give length of strap desired.

No. 1

Metropolitan Expansion Plugs

(Creosoted)

The cheapest and most efficient method for making wall connections. The holding power of this plug is enormous and is suitable for a great variety of work. Cut No. 1 shows a perspective view of the plug with screw inserted. Cut No. 2 shows plug being driven in, by means of driving tool. Peg expands plug as latter is driven in. Sizes ⅞" and 1" diameter.



No. 2

New York Ground Clamp

For connecting ground wires to pipes or cables. Cheaper than a wrapped connection, as good as a soldered connection. Does not injure the pipe. Can be applied quickly. Adopted by nearly all the largest telephone companies in the U. S. Place a few in the hands of your instrument men. They will like them, as well as your engineers. Write for free sample and catalogue. Fits all sizes pipe.

(Patented)

Yonkers Specialty Co., Yonkers, N.Y.

H. C. Roberts Electric Supply Co., Agents.

Western Electric Co., Agents.

AMERICAN FLECTRICAL WORKS

OUR SPECIALTIES:

TELEPHONE WIRES AND CABLES

CHICAGO, 135 Adams St. PHILLIPSDALE, R. I. NEW YORK, 26 Cortlandt.

STAR EXPANSION BOLTS

ALL STYLES—ALL SIZES

100 OTHER TYPES in Lead, Malleable, Bronze or Brass.

100 OTHER TYPES for Wood, Lag or Machine Screws.

Quick, Labor-Saving Fastenings to Brick, Stone, Marble, Tile and Concreting

Catalog and Samples—Yours for the Asking

Star Expansion Bolt Co., Bayonne, N. J.

BUY BELDEN RECEIVER AND DESK-STAND CORDS

Our No. 3 Catalog makes it easy to order Belden cords. Every kind of telephone cord is explicitly described with pictures, showing each arrangement of tips, clips, stay cords and terminals.

HAVE YOU RECEIVED A COPY?

BELDEN MANUFACTURING COMPANY

194 Michigan Street, CHICAGO

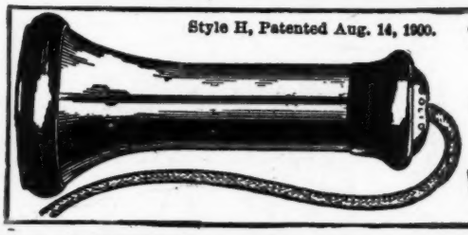
"We Can Save You Dollars—Ask Us?"

SPECIAL AND STANDARD SCREW

COLLAR AND FILLISTER CAP SCREW

New Haven Machine Screw Co.

NEW HAVEN, CONN., U. S. A.



Style H, Patented Aug. 14, 1900.

The Handsomest and Best Telephone Receiver Made.

TRADE "SOLID" MARK

Wm. J. Murdock & Co.

Chelsea, Mass.

NATIONAL GALVANIZING CO.

749 to 759 Carroll Avenue

CHICAGO, ILL.

Galvanizers of everything by the hot process. Guaranteed to stand the four-dip (Western Union) test. Bars, angles and rods cut to length, punched or drilled to specifications.

We are Headquarters for

Belts, Safety Straps, Climber Straps and All Kinds of Leather Goods

Ask your jobber for our goods, or write us for prices

OTTO BUNGE, 1130 St. Peter St., Indianapolis, Indiana